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ABSTRACT

The status of metric education at the elementary school level is discussed in this paper. Elementary school curriculum, instructional materials, communication, scope and sequence, metric terminology and usage, teacher training, and educating the adult population are briefly covered. Metric implementation in the United States is summarized for each state and territory. Names and addresses of institutions and organizations involved with metric education are listed, their activities summarized, and metric materials which they have developed are noted. An annotated bibliography is provided, with entries organized into ten categories: teacher education materials, references for teachers, bibliographies, kits for students, student activities, games for students, audio-visual materials, books for students, charts, and hardware. Commercial suppliers of metric materials are listed. Appendices include a bibliography of articles from National Science Teachers Association (NSTA) journals; lists of elementary science curriculum projects, elementary science textbook series, and science textbooks for teacher training; and reproductions of RESOURCES IN EDUCATION (RIE) abstracts from ERIC on metric education. (DT)

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METRIC (SI) EDUCATION
AND
SCIENCE INSTRUCTION IN THE ELEMENTARY SCHOOLS

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METRIC (SI) EDUCATION AND SCIENCE INSTRUCTION IN THE ELEMENTARY SCHOOLS

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ABSTRACT

The teaching and use of the metric system (SI) of measure is underway in the elementary schools across the United States--kindergarten through sixth grade. Educators, instructional material producers, teacher training institutions, school-community groups, professional organizations, and state and local governments have assumed varying degrees of responsibility for metrication. This paper discusses the status of metric education at the elementary school level, the impacts, trends, developments, implications, problems, and presents some recommendations.

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METRIC (SI) EDUCATION

AND

SCIENCE INSTRUCTION IN THE ELEMENTARY SCHOOLS

Prepared by

Phyllis Marcuccio

INTRODUCTION

The first item of business upon the official formation of the National Science Teachers Association, July 4, 1944, was the adoption of a resolution urging Congressional action for post-war adoption of the metric system of measurements. Through the years, the Association's Board of Directors has issued numerous supportive resolutions favoring metrication, and these were often communicated to the appropriate legislative committees.[1] An example of NSTA's position is briefed in the following 1969 statement adopted by the NSTA Board of Directors:

Conversion to the Metric System

> The National Science Teachers Association applauds the authorization by Congress in July 1968 of a study of the advantages and disadvantages of converting to the metric system. We recognize the need for an objective evaluation of all aspects of the conversion process and for sound guidance in planning and implementing those changes essential for a more extensive use of the metric system in the United States.
>
> The efficiency and effectiveness of the metric system have long been evident to scientists and educators. The desirability of a worldwide, uniform system of measurement is obvious; approximately 90 percent of the earth's population resides in nations committed to the metric system. For the United States, conversion appears necessary and inevitable. The Association therefore strongly urges that the metric system and its language be incorporated as an integral part of the education of children at all levels of their schooling.

NSTA was one of the organizations invited by the United States Department of Commerce, National Bureau of Standards, to participate in their three-year U.S. Metric Study to evaluate the impact of the metrication trend, and to consider alternates for a national policy.

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[1] Carleton, Robert H. The NSTA Story, 1944/1974, NSTA, Washington, D.C., 1976, p. 83.

In 1970, an NSTA ad hoc Committee headed by Bobby Woodruff, Ridgewood High School, Ridgewood, New Jersey, prepared the Report of the National Science Teachers Association Ad Hoc Committee for the Study of Conversion to the Metric System of Measurements.[2] This report described the status of use of the metric system in science teaching at various grade levels, the advantages and problems in teaching and using the metric system, its possible future effects, and the problems and costs of conversion. NSTA further recommended a ten-year conversion schedule for educators:

Ten-Year Conversion Schedule

Year	Proposed Plans
0-2	Planning, training, support for research and other preparations
3-7	Grades 7-12: metric system to be taught and used exclusively throughout the disciplines Grades K-6: metric system taught as a "first language," customary system taught as a "second language."
8-10	Metric system used exclusively in all disciplines in all elementary and secondary education

The paper was included among the official documents prepared by the Department of Commerce to support its recommendations to Congress that the United States "Go Metric."[3]

---

[2] The metric system of measurement refers to the International System of Units (SI) here and in documents from the National Bureau of Standards since 1964. SI stands for Le Système International d'Unités in French. This system was created in 1960 by the Eleventh General Conference on Weights and Measures, abbreviated CGPM after the French Conférence Générale des Poids et Mesures. French is the official language used at these international conferences. The United States is a member of CGPM, and participates in all conferences to refine and streamline SI.

[3] U.S. Department of Commerce. U.S. Metric Study Interim Report--Education. National Bureau of Standards Special Publication No. 345-5. U.S. Government Printing Office, Washington, DC. 1971.

As part of the 1975 (P.L. 94-168) Metric Conversion Act, there is the formation of the U.S. Metric Board. This coordinating board of 17 members appointed by the President will be responsible for a number of functions related to dissemination and coordination of metric information. NSTA has been requested to suggest a nominee for appointment consideration as the education representative.

All NSTA publications, and its three journals, *Science and Children*, *The Science Teacher*, and the *Journal of College Science Teaching*, incorporate and encourage the use of metric terminology. Special publications available from NSTA dealing with the use and application of metric measurement include *Measurement and Metric System Science Packet*, 15 metric teaching aids including centimetre rulers, booklets, graph paper, decimetre box, charts, conversion tables, lesson plans, and resource listings (1973); *Measurement and Metric System Science Packet II*, 15 metric teaching aids including centimetre rulers, booklets, centimetre cubes, NBS materials, film guides, lesson plans, and resource listings (1976); *Metric Is Coming*, an instructional aid which explains the metric system for teachers and provides introductory activities for students in elementary and junior high school (1973); and *Metric Exercises*, a kit for teaching the metric system of measurement, including activities and exercises for different grade levels, a metric ruler, an uncalibrated thermometer, and a copy of the *Metric Is Coming* brochure (1973).

Over the past few years, NSTA has participated in numerous metric conferences and study committees, presented sessions at its national and area conventions, and published articles on teaching and applying the metric system in the classroom and the laboratory.

SCIENCE EDUCATION AND METRICATION

The signing of the United States Metric Conversion Act, December 23, 1975 (PL #94-186) establishes a national policy for coordination of voluntary conversion to the metric system in the United States. This policy has had and will have special and specific implications for all teachers, and especially for the science education community as a whole.

The purpose of this position paper is to comment on the status of metric education in the elementary school and to bring to the attention of the elementary school educator in particular the elementary school science educator the trends, developments, and implications resulting from metrication along with some related recommendations. The task of conversion to a different system of weights and measures has impact in all disciplines and is essential to and has application for the teaching of subject matter throughout the elementary school curriculum and beyond. Likewise, the statements and recommendations presented here will have implications at all levels and in all areas.

Learning, teaching, and applying the language of the metric system is first a responsibility of education; and hence, inherent in the process, a responsibility of all teachers. No one teacher, nor one classroom experience, nor legislative dictum can be expected to accomplish the task of helping "America Go Metric." Total metric education, in fact, is a cooperative school-community endeavor.

Metric measure and usage have been common to scientists worldwide in laboratories, scientific literature, and research. Yet, until the development of the "new" science curriculum programs of the 1960's, the American student was not exposed in public school to the language of the metric system before taking general science courses at the junior or senior high school level. And, it was conceivable that if a student took no science courses at all, he or she might never encounter the metric system during the school experience.

Today, all courses in science at all grade levels teach and use units of measure and increasingly these units of measure are in the metric system. By fall of 1976, almost every state and the District of Columbia will have moved toward some kind of implementation plan or timetable for the teaching of the metric system in the elementary school. Forty-five states and territories have taken action to have the metric system taught throughout their K-8 systems by 1978. Plans vary from setting up guidelines, to teacher training, to classroom practice. Many have active comprehensive programs in operation. Of the remaining states, Massachusetts is planning implementation by 1980; Missouri has encouraged metric education on a local level; and no date for implementation has been projected yet by Indiana, South Dakota, Kansas, Wyoming, and Alaska. For a brief report of the status of the metric education implementation in the various states, see "Metric Implementation in the United States and Its Territories" elsewhere in this paper.

Of the generation of elementary school science curriculum programs which were a direct outgrowth of the projects funded by the National Science Foundation in the 1960's and that are still in active use in the elementary schools today, all profess to utilize arbitrary and/or metric measure and metric tools for classroom and laboratory activities. For the most part this is so; however, discrepancies and exceptions in application occur. For example, in instances where a child is dealing with quantities which are more familiar in customary units than the metric equivalent; e.g., distances to the moon or the sun, then the customary measure is used. In the teacher's guides, where references to measure and lists of materials or instructional procedures are suggested, metric and customary units are mixed freely. In one program, the customary measure is provided in parentheses after every metric measure. Gradually, such inconsistencies and dual system practices are being converted as the metric system (SI) gains acceptance and application. The elementary school programs referred to here cover a scope and sequence from kindergarten or first grade to sixth grade and include: Conceptually Oriented Program in Elementary Science (COPES), Elementary Science Study (ESS), Minnesota Mathematics and Science Teaching (MINNEMAST), Science--A Process Approach (SAPA), Science Curriculum Improvement Study (SCIS), Unified Science and Mathematics for the Elementary School (USMES), and the University of Illinois Astronomy Program (UIAP).

The transition to metric terminology in the elementary science textbooks series for students is similar to that of the comprehensive curriculum programs. Of the major series published (new and revised) since 1970, three use the metric measure as the primary system; but frequently mix in the customary system through illustration label or procedural instructions (teaspoons, inches, feet, etc.). Several other series use the metric system with the customary measure given in parentheses. Still others use customary units primarily and include the metric equivalents in parentheses.

The elementary science textbooks designed for the training of teachers both in graduate and undergraduate courses are also in a transitional stage similar to the textbook series for the children. While most of these books have references to, or chapters about, the metric system, the customary system is interspersed throughout the content and illustrations. Some authors draw attention to the need to know and use the metric system and point out that teachers should be careful to separate the two systems when both are to be taught in the school. Through this approach dual system teaching is perpetuated.

Although the focus of this paper is on metric education in the elementary school, attention must be drawn to text material published for the middle school-junior high levels as well as senior high. Not only is there a transition delay in these materials as well, but many of the texts which have been revised now mix the modernized metric system units called SI with those of the obsolete versions of the metric system. Apparently some publishers, producers, and secondary educators are not aware that SI is different from some of the metric system used before 1960 -- when the centimetre-grams-seconds (cgs) system was in use as were also such metric units as calorie and kilogram-force. SI is a logical outgrowth of metre-kilogram-second (mks).

The recent changes in the regulations for textbook adoptions in most states requiring that all instructional materials purchased from fall 1976 onward include the metric units of measure will have immediate impact on the complete transition by publishers to metrication compliance. Nevertheless, such a move will not have full impact in the schools for several years as revisions are costly and slow and textbook purchasing is usually on a three- to five-year cycle. The transition time needed for changing standardized tests must also be considered. Finally, educators will have to allow for a time lag in communication from state mandate to teacher implementation in the classroom since metrication on a national basis is only voluntary.

The Education Research Information Clearinghouse (ERIC) for Science and Mathematics of The Ohio State University recently completed a cursory search of the literature concerning the teaching and learning of the metric system. (See the annotated bibliography appended to this report.) In 1970, there were 11 articles, a pamphlet, and two dissertations reported in the retrieval. Six years later, there are 68 documents on the list as of August 1976, and only five are directed to metric education research on the use or effectiveness of instructional practices. Most of the literature cited consists of guidelines, reports of programs, bibliographies of materials available, or papers describing the needs and/or implications of metrication. The obvious lack of interest in metric education research into methods for teaching the metric system has several implications such as: (1) Doctoral candidates are not motivated to consider metric teaching as an area of priority; (2) Funding agencies are not interested; (3) Only limited effort is being expended to teaching the metric system in the classroom; and (4) Science and mathematics educators are looking to data from other sources. Research at this primary stage of metrication is essential. Educators (not only those in science and math) must move to review the suggested procedures for metric implementation and study the effectiveness of the currently available programs and materials immediately.

METRIC EDUCATION IMPACT: TRENDS, IMPLICATIONS, AND RECOMMENDATIONS

Even with the lack of research, evaluation tools, and clear scheduling for implementation, states have moved forward vigorously developing teacher and student training programs as well as guidelines for metric terminology in an effort to comply with the Metric Conversion Act. Producers of instructional materials and national organizations in education and science have also risen to the challenge.

All of this uncoordinated activity has stimulated a number of trends, developments, implications, and problems in the (1) elementary school curriculum, (2) instructional materials, (3) communications system, (4) classroom instructional strategies, (5) metric terminology and usage, (6) teacher training, and (7) educating other members of the adult population. Each of these areas is examined and some recommendations offered in the following section of the paper.

1. Elementary School Curriculum

Incorporation of the teaching of the metric system into the elementary school curriculum has had the most dramatic impact on the teaching of mathematics. Mathematics educators have assumed the major responsibility for integrating instructional units in metric measure into their programs.[4] Through the coordinated efforts of members of their professional organization, (the National Council of Teachers of Mathematics), institutions of higher education, the state department coordinators of mathematics, and other agencies math teachers have taken the lead toward metrication in the schools.

Unfortunately, mathematics curricula and instructional materials are in the same transitional stage (to SI) as science. Since many of the same measurement tools and techniques are used, the same inaccuracies and inconsistencies occur in the terminology and usage of metric measure. This situation does not imply that there is need for new material, but rather a need to convert the plentiful supply of good material already available to SI.

The teaching of the metric terms and relationships have been part of the science program traditionally. Science education has used the metric system as the primary language of measurement and has applied it in laboratory and classroom activity when dealing with measures and calculations at the secondary level. Until the national interest toward conversion, metric measure was limited to scientific notation and used for communication among members of the scientific community. The nationally-funded elementary science programs involved these scientists; hence, metric usage was incorporated into the elementary school as an integral part of all scientific measurement. In fact, two of the science curriculum programs (SAPA and MINNEMAST) have special metric teaching units which can be used independently from the main program.

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[4] Henry, Boyd, et al. "Metric: not *if*, but *how*." *Arithmetic Teacher*, May 1974.

In any event, whether basic instruction in metric is taught in the mathematics or in the science classroom, parallel teaching strategies and instructional techniques are employed. Virtually the same equipment is used, the logical sequencing of lessons and events is alike, and the same types of "hands-on," concrete experiences are practiced. In fact, so many of the mathematics activities are built around science explorations and equipment, that one wonders if nonscience-trained teachers will mistake a math activity in metric as a fulfillment of a weekly science lesson.

Measurement, in all cases, is treated as a concept and includes a strong concentration on what measurement is. A logical sequence of events leading toward an understanding and appreciation for universal standards is developed. The process involves observations, estimations, comparisons of objects, personal choices of standards for comparison, eventual comparisons of personally chosen and used standards to those of others, and finally realization of the need for agreed upon standards of measure for communication. This last activity leads directly into international standards, and, the metric system (SI).

Some educators consider that this approach and the usage of the metric system offer an improvement in the teaching and learning of the concept of measurement; they suggest children learn the metric system more rapidly and easily than the customary measures,[5] though evidence supporting this claim is minimal or nonexistent.

No matter how comprehensive the science and mathematics programs are for metric teaching, the total responsibility for metric education is not theirs alone. There is a critical need to incorporate metric usage throughout the curriculum and every teacher must think and speak the language. This policy has been called for by several groups such as ICME.[6] Total immersion throughout the school experience is important. As has been pointed out in the recommendations for implementation in the United States from the metrication experiences of five other nations, math and science are not the only areas affected. All subjects are involved, especially the social sciences including vocational training, home economics, geography, and mapping.[7]

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[5] Department of Educational and Cultural Services. Administrative Letter No. 53. Augusta, Maine. November 25, 1975.

[6] Tardif, Robert, et al. Interstate Consortium on Metric Education, Recommendation #10. California State Departemtn of Education, Sacramento, California. 1975.

[7] Chalupsky, Albert B., et al. Going Metric: An Analysis of Experiences in Five Nations and Their Implications for U.S. Educational Planning. National Institute of Education Project American Institute of Research, Palo Alto, California. 1974.

Children have little trouble grasping the metric system, especially if their teachers demonstrate their own personal commitment. State policies reveal a tendency to phase out the customary system from the first grade upward, over a period of years. The approach is probably based upon the assumption that it is easier to deal with the simple terms first. Actually, metric is simple at all levels and so the phasing out technique is more for the convenience of the adults than for the children. Implementation cost as well as delays in obtaining prepared text materials might also be a factor influencing the "phasing out" approach. Some states have incorporated stopgap guidelines and locally designed instructional materials for use until funds are available for the purchase of updated commercial materials. But delays are costly too. Immediate assimilation would do away with the need for teaching dual systems and supplemental materials. One additional problem facing implementation is resistance, not only against change, but to incorporating another instructional assignment in the schools. The current trend toward basics has enough curriculum impact on the classroom teacher. The added prospect of including an area where there is more preparation necessary by the teacher also complicates the matter.

Recommendation: Educators at all levels and in all disciplines or education priorities must commit themselves to immediate transition to the metric system (SI) in all phases of their professional endeavor and in particular when dealing with children. There should be an immediate assimilation of the metric system;

and science and mathematics educators should continue to assume the responsibility for leadership to these ends in their schools and communities.

2. Instructional Materials

The enormous proliferation of instructional materials in both hard- and software for metric education is staggering. See the annotated listings at the end of this paper. Much of the material is prepared for use in the elementary school, either for the education of students or of teachers--preservice and inservice. Some of the items are good, useful, and well designed; some are not. Unfortunately, the sheer abundance of poor materials has contributed to the confusion of choice and created a number of other problems for educators, in particular elementary school classroom teachers.

The mere presence of so much teaching matter suggests subtly that metric education is complicated and that surely considerable training will be needed to handle the assignment properly. Also implied by the profusion is the concept that large amounts of new material are needed for metric education. At least, a more sophisticated background will be needed just to make choices about instructional materials for use. In light of the inservice and preservice necessary to incorporate most basic programs into the elementary curriculum, more training might well be assumed by classroom teachers. Thus, the simplicity, ease, and positive motivations toward the use of the metric measure is placed at a disadvantage at the outset.

Much of the material which has come under criticism is of original design by the vendor and intended for use independently or as supplement to existing mathematics and science programs. In many instances, the material has never been evaluated or trial-tested with students. Technical accuracies, appropriateness, durability, legibility of readings, appropriate sizes, costs, and safety qualities (toxic paints or plastics, fracturing, sharp edges, flammability, etc.) are areas generating criticism from teachers after they have tried to employ the materials in the classroom with students. Teachers are skeptical, too, about the quality of learning theory employed.

To counter these problems a number of states and national organizations have called for basic national selection guidelines and standards. The 1965 Purchase Guide for Programs in Science and Mathematics produced as a joint project of several agencies, was invaluable to educators involved in purchasing instructional materials with National Defense Education Act (NDEA) funds.[8]

It should be remembered that the metric system is a basic language, not only for international communication, but for computing, interpreting, and applying science concepts and principles. The enormous attention given metric education suggests that the field is a discipline on its own, when in reality the system is merely a change of language in measuring quantities. In fact, the basic measuring tools needed to teach the metric system can be found in any elementary school science center, room, or laboratory, especially if the school has a comprehensive science program. The types of measure covered in the elementary curriculum, kindergarten through sixth grade, include linear, mass (weight), volume, and temperature and call for these familiar measuring tools calibrated in metric:

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[8] Council of Chief State School Officers with the assistance of the National Science Foundation and others. 1965 Purchase Guide for Programs in Science and Mathematics. Ginn and Company, Boston, Massachusetts. 1965.

LINEAR MEASURING TOOLS - rules of different lengths for use at desks, in the classroom, and outdoors

MASS (WEIGHT) MEASURING TOOLS - balances with capabilities to measure small and large amounts

VOLUME MEASURING TOOLS - vessels or containers of various capacities for large and small quantities

TEMPERATURE MEASURING TOOLS - thermometers calibrated in degrees Celsius.

In some cases, local schools have recalibrated old equipment with metric equivalents until new instruments are purchased on the usual replacement cycle. However, whenever these purchases are made, it would be helpful if some national standards or guidelines were available. The guidelines would not only assist the teacher, but they would have a sobering effect and influence on the vendors, producers, and manufacturers of metric education material.

Recommendation: A set of criteria and guidelines should be prepared to aid classroom teachers and other educators to evaluate and select metric education materials for purchase and use.

3. Communication

Metric conversion is voluntary over a ten-year span. Without compulsory directives from the government, national implementation is moving slowly. As implementation has been left to the individual states, the process and timetable designed by the state departments of education have varied from state to state. However, through the funds made available to the field of education by the Education Amendments Act of 1974 (P.L. 93-380), several national associations and organizations have formed synergistic or cooperative bodies to deal with metric transition problems.

In an effort to benefit from each other, communicate progress, and coordinate efforts for the metrication of the American public through the school systems, many states have joined together in consortia, councils, alliances, programs, and/or agencies. In some cases, teacher training institutions in bordering states have collaborated on instructional programs or the development of metric education guidelines for training workshops. As the state by state reports at the end of this paper show, almost every state and territory has some type of implementation plan in operation, but without a national mandate, the degree or stage of action varies. Several problems result: (1) The children of mobile families may not be given consistent metric system instruction; (2) The voluntary approach permits slow transition; (3) There is no authority to enforce transition; and (4) There are no agreed upon standards of metric system information or guidelines.

The largest of the multi-state efforts has been the Interstate Consortium on Metric Education (ICME) which consisted of 28 states and territories whose representatives met in 1974 for the purpose of planning how the nation's educational institutions could prepare Americans to understand and use the metric system.

The ICME was supported by a grant under the Elementary and Secondary Education Act, Title V. The participating states and territories had the common policy of centralized curriculum adoption. The proceedings resulted in 23 recommendations for use as general guidelines and principles to assist state education agencies and others involved in developing metric education programs. These recommendations have been widely distributed and used as compatible with local needs.

The many groups offering information and guidelines for metric system training are not working together and frequently find themselves at odds over interpretive or editorial issues. The nonscience and nonmathematics educator is indifferent to the debates of experts in the field even though looking to these authorities for guidance and assistance.

One of the most important recommendations to come from the British and Australian experience in converting their populations to metric measure was that the U.S. transition be done nationwide, on a strict schedule and that the government take an active role in implementing and enforcing the changeover. There is also, need for emphasis on public awareness and involvement in metrication early and throughout the conversion period. Action should take place in education, even if it cannot be done in industry. Advanced and extensive planning is needed and recommended, especially with regard to equipment and standards.

Communication was one of the two major problems encountered by the Australians in metrication, the other was money.[9] It seems there are too many places in the educational system where information never filters down from the top. There are potential gaps between administrators and principals, principals and department heads, and the final stopgap is the clerical staff who may tidily file notes, bulletins, and circulars so that they never reach the teachers.

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[9] Chalupsky, 1975, op. cit.

Recommendation: There is a need for a consistent program of metric implementation which will be communicated to all areas of the education field to be carried out in an orderly, predetermined fashion.

4. Scope and Sequence

Classroom practices and teaching strategies for introducing the metric system vary from school to school. For the most part, when metric measure is treated as a separate subject area with specific objectives and instructional strategies it is incorporated into the mathematics curriculum. The scope and sequence usually reflects a concern for how and at what level or developmental stage children learn to conceptualize about measure.

Several general trends toward successful metric education practices have emerged and are being encouraged. Some of these recommended trends are:

1. Avoid conversion activities between the customary system and the metric measures.

2. Avoid dual system training. Teaching both systems tends to slow down the transition and encourages conversion.

3. Avoid extensive conversion activities within the metric

measures; for example exercises converting millimetres into centimetres into metres and the like.

4. Guard against too much emphasis on including all prefixes with all metric units. Milli, centi, kilo, and deci are most frequently used and must be reinforced in learning. The logical progression of tens in the system will probably interest only some older children and adults.

5. Be certain to include large numbers of "hands-on" experiences with metric instruments.

6. Do not expect the teaching of the metric system to end the need for the teaching of fractions.

7. Decimals and annexing zeros are important for precision in metric measure and will probably need special emphasis.

8. Include the historic development of the metric system in teaching as a means to give the learner some basic, personal "feel" for the "unnatural" units of the metric system.

9. Carefully correlate the activities and terms to the maturation level and development of the students. For example, primary teachers in England found it difficult to use millimetres (too small), kilograms, and litres (too large), with small children and recommended the use of centimetres, grams, and millilitres.

10. Encourage understanding of the interrelationships of metric measure, e.g., millilitre to cubic centimetre to gram.

11. Use scales (divisions between whole numbers) which correspond to the decimal system, i.e., 0.5 cm, 0.2 cm, 0.1 cm and not 1/4 or 3/4.

There are other contentions about the benefits to the curriculum of teaching the metric system which come from experienced practitioners; however, there is not enough research available to support the claims. Some of these claims are: (1) Metric teaching at the lower grade levels frees time normally spent teaching it in upper grades and, therefore, allows for more science teaching time; (2) The metric system is learned more easily than the customary system by children of all abilities; and (3) Metric calculations are simpler and quicker than the customary system.

Recommendations: Use of the 11 trends listed above should be encouraged, but additional research to support their validity is needed.

5. Metric Terminology and Usage

The language of the International System of Units (SI) has had many interpreters. The results of some of their work are demonstrated in the instructional materials discussed elsewhere in this paper.

The SI symbols (not abbreviations) are designed for worldwide usage, even in languages where the Roman alphabet is not used. These symbols represent the official notations as agreed upon by the CGPM for SI units.[10] Other language rules of SI pertain to matters of style for international notation, e.g., the use of a comma in place of a decimal, superscripts for squared and cubed measures, and the deletion of commas as separators in long numbers. Many other style standards apply to pronunciation, spelling, usage, and typography. Eventually, these inconsistencies will be reduced as metric terminology is applied. For example, several independent groups have tried to clarify and define SI by drawing up helpful style guides for use by editors and writers.[11] Of course, not all interpreters agree about usage.[12] Already, some areas open to interpretation have stirred unrest and stimulated ardent supporters on both sides.

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[10] U.S. Department of Commerce. *The International System of Units (SI)*. National Bureau of Standards, Special Publication #330, U.S. Government Printing Office, Washington, DC. 1974.

One controversy over concept definition and term usage has had some negative effects on the teaching of mass and weight at the elementary school level. Elementary teachers with little or no science background tend to avoid trying to clarify the two concepts. Even science trained educators at the elementary school level are confused with the ambiguity created by the popular use of the word "weight." Statements from authorities on usage and clarification conflict. Here are a few examples:

> Considerable confusion exists in the use of the term weight as a quantity to mean either force or mass. In commercial and everyday use, the term weight nearly always means mass; thus, when one speaks of a person's weight, the quantity referred to is mass. This nontechnical use of the term weight in everyday life will probably persist.
>
> American National Standards
> Institute

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[11] American National Metric Council. Metric Editorial Guide, Second Edition. Washington, DC. July 1975.

[12] NOTE: In July 1973, the NSTA Board of Directors adopted the spellings "meter" and "liter" as the preferred usage for NSTA publications (consistent with the National Bureau of Standards style). However, the spellings of "metre" and "litre" are used in this paper by requirement of the U.S. Office of Education.

. . . it is better to avoid its use [weight] in technical practice except under circumstances in which its meaning is completely clear. Instead, the terms mass and force of gravity (gravity force) should be used, together with the appropriate units kilogram (kg) and newton (N), respectively.

American National Metric Council

. . . the mass of an object is directly proportional to its weight on earth. That is, a one-kilogram mass has a weight of about 9.8 Newtons at sea level; a two-kilogram mass has a weight of about 19.6 Newtons; etc. Thus, either mass or weight gives us a good measure of how much matter an object contains. Therefore, in everyday usage spring scales are used for determining mass in kilograms because it is much more convenient than using a balance. The 4M COMPANY (pamphlet) uses the words interchangeably - mass (weight). For everyday usage, the distinction is unimportant.

University of Hawaii

Use the word mass to refer to kilograms and avoid using the words weight and weigh.

Interstate Consortium on
Metric Education

In the elementary school, the distinction between mass and weight can be mentioned but children should be allowed to use the term "weight" in their work. Mass is a fundamental concept. Like length and time, it is one of the basic ideas upon which much else is defined. Mass is sometimes thought of as the amount of material in an object. Weight is the measure of gravitational force on a mass (object) and varies with the location of the object. The weight of an astronaut on the moon is less than his weight on the earth because the force of gravity is less on the moon. He may even be weightless in a space station such as Skylab. However, his mass is the same in all three places. We have been so used to using the term "weight" incorrectly that "weight" will still probably be used for everyday purchases even in cases where the correct term would be "mass."

New York State Education
Department

Develop the correct concepts of mass and force by using the "kilogram" as the unit of mass and the "newton" as the unit of force and weight. The Task Force recognizes that, in day-to-day conversation, measuring the matter present in objects may continue to be referred to as "weighing."

Indiana Metric Education
Task Force

The fundamental SI unit of mass is the kilogram. But because the gram was originally the basic metric unit of mass (then called weight), . . .

The Canadian Metric
Association

The concept of mass is relatively easy for children to grasp. Although there is a technical difference between the concepts mass and weight, which is of interest to adults, this difference should not be a concern for most children until they are in the upper elementary or secondary grades.

Within the classroom setting, children should be taught to use such words and phrases as "mass" and "the mass of the object." Outside the classroom, children will encounter the word "weight" being used as a synonym for the word "mass." This usage of the word "weight" should be tolerated but not advocated in the instructional program.

California Mathematics
Education Task Force

. . . . Because it is easy to confuse the mass and the weight of an object it is important that the measurement of weight be taught carefully and that the statements children make about weight be correct. . . .

Science--A Process Approach
(1966 - AAAS)

The use of the term weight for mass is technically incorrect. However, weight has been used incorrectly for so long in this country that it is almost part of our cultural heritage. For that reason we shall continue to use the term weight in reference to the metric mass units, hopeful that the reader will make the proper distinction when the sophistication of his use of these units requires it.

Ohio Department of
Education

. . . . Units of mass (kilogram, gram, etc.) may often be used informally when references are made to weight. Mass and weight are not synonymous terms, however, since weight varies with the amount of gravitational pull on an object, and mass does not. Measurements may be taken of weight using. . . spring scales. . . . Measurements may be taken of mass using. . . metric pan balances. . . .

Arizona Educational
Information System

In spite of the distinct difference between mass and force of gravity, the student will find that "weight" is often used as a synonym for either of these characteristics.

In the everyday world, "weight" generally means "mass"; as a rule, in scientific circles, it means "force of gravity." It is recommended that teachers introduce the term "mass" in relation to measures made in grams and kilograms. It is not wise to make a strong issue of this matter with students, particularly the young. The important issue is that students understand the meaning of mass.

The terms "weight" and "weigh" may be used in the classroom when it is perfectly clear from the context which of the meanings is intended; most often in casual conversation the words will mean "mass" and "find the mass of." When recorded, however, these latter expressions should be used to avoid any ambiguity for the reader.

Canadian Council of
Ministers of Education

From the physicist's and the science educator's point of view, it is essential and scientifically correct to clarify the difference between these two concepts. Furthermore, science laboratory equipment is now in common use in the elementary school, and children should be given accurate science instruction about the proper use of this hardware.

While it is essential that science be taught accurately in the schools, it is also essential that the curriculum reflect events and things in everyday living so that learning in school has meaning and application in real life. The prime concern in teaching science at any level is to develop skills in problem solving that will help a student live in the real world.

Not only are the teachers perplexed by the problem, but many instructional materials producers have resorted to unusual techniques to make their products marketable. One film producer has two versions of the same film on measuring grams and kilograms--one using the term "mass" and the other using the term "weight."[13] The teacher is to order the version that best fits the curriculum needs.

Any number of alternatives to solving this problem have been suggested by math and science educators. The most practical for the elementary school classroom is that when dealing with mass as a concept, the interchangeable use of "mass" and "weight" (and all their derived words) be permitted in hopes that we will eventually discontinue the use of the word weight when dealing with force and/or force of gravity and thereby end the confusion.

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[13] Perennial Education. The Kilogram, Color, 12 minutes. Northfield, Illinois.

Recommendation: For matters concerning definition of units, style, and spelling, the International System of Units (SI) as modified by the National Bureau of Standards should be adopted for use in the elementary school (K-6). (See NBS reference LC1056.)

6. Teacher Training

One of the best ways to infiltrate and motivate for change to the metric system is to stimulate the cooperation and education of the elementary classroom teacher. Successful implementation will take his or her patience and ingenuity. If the teacher can be convinced of the importance and simplicity of metric measure, U.S. conversion is not far off.

Large amounts of money and energy have been poured into the metric education of teachers through the Metric Education Conversion Act of 1975 in belief that gradually teachers will support the move and become trainers of their students, colleagues, and the community. For the most part, the inservice training has been accomplished through local or state coordinated sessions under the direction of state departments of education and/or educational institutions. Preservice programs have been independently designed and coordinated by institutions of higher learning. State guidelines are considered in the course outlines.

Since metric conversion is voluntary, the course offerings in inservice have had to include incentives for teachers such as college credit, compulsory attendence, or requirement of inservice credit. Even so, there is resistance and apathy. Trainers have found that the inservice sessions are the most successful when they are busy, activity-oriented, and involve the teachers directly with the same materials and experiences that their students will have.

There are three degrees of familiarity with the metric system found among elementary teachers and principals at inservice training sessions: (1) Those with no background and limited interest in the "new" system who need persuasion and motivation to change or accept; (2) Those with some background in science and, therefore, acquainted with metric usage, but who are not familiar with the SI metric system; and (3) Those with training in SI metric measure. All of these groups demand some inservice attention. The depth of the activity or workshop participation may be limited on the part of the last group; but even they require specifics in curriculum design and development, school system policies and practices regarding the usage, instructional material guidelines, parent involvement techniques, and suggestions for methods of teaching children at various ages and skill levels. Everyone needs continuous reinforcement and stimulation to "think and speak metric" with their students.

Components for an inservice teacher training course in the metric system have been suggested by task force groups such as the ICME.[14] Many states have adopted and applied the ICME "Suggestions for Teacher Inservice Training" in their programs or have elaborated on these guidelines to produce their own designs.[15]

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[14] op cit. ICME. p. 13.

[15] Some examples include the Guidelines for Metric Education in Vermont, the implementation plan for the state of Louisiana, and the California Inservice Guide to Teaching Measurement.

Others have evolved programs through the efforts of other consortia.[16]

Commonalities appear in these inservice courses: (1) The inclusion of an awareness and motivation stage in the training which includes historic background, advantages of the system, and rationale for conversion; (2) Statements of goals and objectives for teachers, students, school, and for working with the community to overcome resistance; and (3) Instructional techniques which involve numerous "hands-on" experiences scheduled over several sessions.

Frameworks or styles for presentation vary widely. Sessions may be large, one-day state conferences, or small, periodic staff meetings within a school, or somewhere in between. Frequently, these programs are coordinated by metric trainers from state departments or coordinated by school districts. In an effort to assist schools and school districts, some institutions of higher learning offer services in metric education training. Different types of workshops can be selected and/or tailored to meet the needs of the individual group.[17]

Once again, nationwide coordination of effort is lacking. While it appears that many excellent and intensive programs are being developed and used in a number of places, there is not much known about the effectiveness of the many teaching strategies employed; a problem not unlike that in the availability of instructional materials.

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[16] Metrication in Delaware (member of a five-state consortium).

[17] Center for Metric Education and Studies, Western Michigan University, Kalamazoo, Michigan.

7. Educating the Adult Population

That metric education is a school-community endeavor is a well-documented premise.[18] Resistance to nonconversion must be led by educators. Parents are depending upon schools to prepare their children for the future. Many career opportunities for today's school-age children will depend upon their knowledge and use of the metric system. Schools will need to prepare teachers for reaction to and education of parents. Some teachers may be able to act as trainers or consultants for small businesses, local industries, and government.

Metrication is a public service job for the schools. Cooperation of community services, businesses, civic groups, and the media is the only solution for reaching nonparents and other adults. Most of the adult population will be self-taught. The media can be extremely helpful through awareness campaigns by applying metric measure wherever possible--news reports, weather, public information spots, and special programs.

In preparation for the resistance to be encountered from parents, inservice guidelines for teachers in several states include suggestions for ways to increase community awareness and understanding, e.g., parent workshops, civic lecture programs, and community projects--bake-offs, contests, metric fashion shows, exhibits, proclamations of "metric days," "metric weeks," etc. School children serve as a natural link to adults and can be enlisted to help educate their parents. The attitudes of the students and teachers will be reflected by all.

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[18] U.S. Department of Commerce, 1971, op cit.

SUMMARY

The incorporation of the metric system is in several stages of implementation in the elementary school classrooms of the United States. The units of study where the metric system is taught, encouraged, and practiced fall into the science and math disciplines. In elementary school science, measurement is dealt with initially as a concept. Later, the language for communicating about that conceptual framework is metric. Metric units are computed, recorded, compared, and interpreted to extend or deepen understanding of science explorations.

State departments of education and local school groups, with the encouragement of national organizations and higher education institutions, have assumed the responsibility for equipping and training elementary teachers, and for developing guidelines for metric implementation in the schools. Many successful and promising programs in teacher and student training have evolved as a result.

However, the enormous task of re-educating an entire population to a "new" system of measurement creates problems. In the elementary schools, the problems not only involve overcoming the natural resistance of adults to change, but also learning to cope with the number of specific requirements created by transition.

Teacher training and support--inservice and preservice--is essential. At the start, teachers need to be convinced of the importance of including and practicing metric measures in all classes--beyond science and math alone. Textbooks and other instructional materials are available in abundance, but they need revision, conversion, and incorporation into the schools as rapidly as possible. The publishing community and specialists in the metric system are working to clarify and define guidelines.

Metrication is not a Federal dictum. The transition to SI in the United States is voluntary, but encouraged through federal legislation. Most states have programs or intentions to incorporate the teaching and use of the metric system throughout their K-12 programs. Nevertheless, the lack of a national timetable is perpetuating delay in transition and thereby allowing a spastic movement toward application and use.

In the schools, classroom procedures and other instructional strategies for metric teaching vary state to state and sometimes school district to district. Without national deadlines and standards for material, little coordinated effort is possible. However, interstate consortia have tried to assume some collective leadership and stated recommendations and guidelines for mutual use.

Finally, educators are in a unique position to contribute to helping the nation "Go Metric." They are the basic ingredient in a highly organized system of communication dedicated to the stimulation and transmission of ideas, attitudes, and skills. They are equipped to develop, evaluate, and apply constructive methods for educational change and improvement. Leaders in elementary schools, therefore, must make their commitment to metrication; to train their teachers; to apply the metric system in all phases of the school programs; to spread their resources into the community to parents, other adults, local businesses, and industries; and to offer assistance to local governments for transition to the metric system of measurement.

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METRIC IMPLEMENTATION IN THE UNITED STATES
AND ITS TERRITORIES

Prepared by

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METRIC IMPLEMENTATION IN THE UNITED STATES AND ITS TERRITORIES

The following state by state summary of the current status of metric education was derived from replies to a letter of inquiry sent to each state and territory. Replies have been received from 43 states and 2 territories. The information supplied has been capsulized to include legislative action, resolutions passed by the state boards and departments of education, training programs, metric materials developed, and in some cases participation in various consortia or other cooperative ventures.

Eight states have indicated that some definitive legislative action has been taken. Legislation is also being considered in other states. State boards and departments of education have been active in passing resolutions and/or developing guidelines for implementation of the metric system. A number of states have participated in one or more consortia on metric education. Other non-participating states have indicated that they have used the guidelines developed by the consortia for their own states. In addition, 24 states have been involved in a joint effort with the Agency for Instructional Television to produce a series of metric television programs.

Of those states that have indicated a target date for using the metric system as the primary system of measurement, most have listed 1980, a few have adopted 1984. Almost all of the responding states have mentioned current inservice training programs or plans for future programs. Many states have proceeded to develop and disseminate various metric publications and educational materials. Guidelines suggest that new textbooks and other materials will be carefully screened to insure that the metric system is included. Some states with textbook adoption policies have indicated that all new books must use the metric system as the primary system of measurement.

ALABAMA - In 1973, the Alabama Legislature passed a resolution directing the State Board of Education to initiate training programs in metric education for teachers. By 1974, over 400 teachers and principals were trained as resource persons for each school system. All vocational teachers were also given training in the metric system. In August 1976, over 600 elementary teachers will take part in metric training sessions. A Metric Advisory Council has been formed by the Department of Education to develop suggested standards for the selection of student materials, inservice and preservice training of teachers, and to correlate metric education.

ARIZONA - The Department of Education has recently received a grant for developing a metric program. They are also participating in a ten-state grant program submitted by the California Department of Education.

ARKANSAS - The Department of Education will begin a program in September 1976 to develop a teaching plan for the metric system and conduct a series of inservice workshops for teachers.

CALIFORNIA - Formal instruction in the metric system will begin during the 1976-77 school year at all levels and in all subject areas. The Mathematics Task Force at the Department of Education has been involved in the production of metric materials including the "Mathematics Framework" and "Inservice Guide to Teaching Measurement." A "Metric Survival Kit" has been prepared and workshops for teachers have been conducted throughout the state. "Guidelines for Metric Education" has been developed by the California Metric Committee. California is a member of the Five-State Metric Consortium and hosted the Interstate Consortium on Metric Education in 1974. In cooperation with them, the Department of Education has developed a motion picture/hands-on workshop entitled "Metre and Litre Are Neater!" The Department has also produced a film, "When Things Get Hectic. . . Think Metric," in association with Lee Mendelson Film Productions, Burlingame, California.

COLORADO - The Science-Math Council at the University of Northern Colorado, Greeley, and the University of Denver Mathematics Laboratory have conducted numerous workshops over the past two years. Key personnel from various school districts have been trained to present workshops for the teachers in their districts. Both undergraduate and graduate courses in metrics have been developed at the universities. Colorado sent a representative to a metric consortium held in California.

CONNECTICUT - In 1974, the State Board of Education adopted a resolution recommending that local and regional school districts begin instruction in the metric system as soon as possible, but not later than September 1977. Approximately 60 workshops have been conducted by the State Department of Education for elementary and middle school teachers in the past three years. Additional workshops have been conducted at the local levels.

DELAWARE - On April 27, 1976, the state legislature resolved that the State Department of Public Instruction devise programs for implementation of the metric system. The State Board of Education approved the Metric Policy Statements on March 20, 1976. The plan calls for a period of planning and preparation to insure that by September 1976 metric materials are available for all students. Total transition to the metric system is set for January 1, 1980. Extensive inservice sessions have been held and institutions of higher learning have been directed to include metric education. Several measures have been taken to educate the general public to the metric system. Delaware is a member of the Five-State Metric Consortium. An extensive report of metric activities in Delaware has been compiled by the Department of Public Instruction.

DISTRICT OF COLUMBIA - In 1961, the Science Department of the District of Columbia Public Schools received a grant from the Joint Board on Science Education to develop a curriculum integrating the teaching of science and mathematics. As a result of the grant, a pilot program was instituted in a class of third grade children utilizing the metric system. Workshops for teachers have also been carried out which deal with teaching the metric system. A course entitled "Scientific Mathematics" was also offered in cooperation with the DC Teachers College.

FLORIDA - A state plan for education in the implementation of the metric system is currently in progress and expected to be completed by June 1977. Plans are being formulated at the Department of Education to develop inservice materials and metric aids. At present, metric workshops are being taught in all districts. Both inservice and preservice courses are offered at all colleges and universities.

GEORGIA - The state policy calls for implementation of metric education activities in all instructional areas where measurement is a normal part of the curriculum. Conversion between the English and metric systems is deemphasized. The Georgia Department of Education established a Transdisciplinary Committee to establish policies, goals, and tasks leading to the implementation of metric education at all levels in the public schools. Georgia was a member of the Interstate Consortium on Metric Education in 1974, whose purpose was to plan for the implementation of the metric system. The state is currently a member of the Agency for Instructional Television Consortium for the purpose of developing a series of programs on metric education. The Georgia Metric Education Committee was organized to produce and publish metric materials. In the summer of 1976 materials were developed for inservice and preservice teacher workshops. Publication is set for the winter and the materials will be distributed in the spring of 1977.

GUAM - In 1975, the Guam Legislature passed a resolution which called for the formation of a five-member Commission on the Metric System. The Commission will make recommendations on the transition to the metric system by December 1, 1976. The Department of Education has been developing a series of curriculum guides which will include measurement objectives utilizing the metric system for the math curriculum. Test items for the Guam Criterion Referenced Tests are also being developed which make reference to the metric system.

HAWAII - The state legislature passed a resolution in 1972 requesting the College of Education at the University of Hawaii to teach the metric system in the public schools on a pilot basis. A metric program with accompanying workbooks was developed for use with grades K-6. The program includes an introductory booklet for teachers to acquaint them with the fundamentals of the metric system. An additional publication, "A Metric Workshop Manual for Teacher Trainers," was developed as a guide for those presenting metric workshops. The College further provides one credit metric workshops for teachers on a complimentary basis. A Metric Advisory Committee was recently appointed by the Governor to coordinate the total community effort at metrication.

IDAHO - The State Board of Education approved the teaching of the metric system in the public schools effective for the 1974-75 school year. Further, all districts will be converted to the system by 1984. The State Department of Education recommended that teacher training courses provide instruction in the metric system; school districts provide inservice training; and textbooks and instructional materials use the metric system. The metric system will be taught as the primary language of measurement at all grade levels. Idaho participates in two interstate consortia to aid in training teachers in the metric system who as leaders will hold inservice programs for other teachers. The State Superintendent of Public Instruction has compiled the "Idaho Metric Guide" which provides basic metric information, suggestions for inservice training, student activities, and other sources of information.

ILLINOIS - On April 24, 1975, the State Board of Education adopted a policy regarding statewide implementation of metric education. As of 1976, the metric system will be introduced as the primary language of measurement. All new text materials that include material on measurement must use metric and offer activities in its use. If recently adopted text materials do not conform, supplementary metric materials must be prepared. All adult and vocational technical education programs must provide the opportunity for metric awareness and instruction. Beginning in July 1975 school districts must initiate planning for the implementation of the metric system. The State Board of Education has developed "A Strategy for Developing Metric Education Programs" which provides guidelines for the implementation. A bibliography, "Source Book of Metric Materials and Equipment for Educators," has also been prepared.

IOWA - For the past two years, the Department of Public Instruction has conducted inservice training in the metric system for teachers of grades K-8. The workshops are awareness and activity oriented and have involved 1500 teachers to date. A workshop packet prepared by the Department is distributed. The program will continue in the coming year. A Federal grant from the U.S.

Office of Education has enabled the Department to begin developing a master plan for implementing the metric system in the schools. The projected goal for complete implementation is 1980. The Department will also address itself to inservice and preservice training. Articles and abstracts are available through INFORMS--Iowa Network For Obtaining Resource Materials for Schools. The University of Northern Iowa and Iowa State University along with other institutions have been carrying on preservice metric education programs.

KENTUCKY - The State Board of Education passed a resolution on October 3, 1974, calling for instruction in the metric system as of the 1976-77 school year. The metric system will be the primary system of measurement by the 1980-81 school year. Many school districts have held or plan to hold workshops for their teachers.

LOUISIANA - In 1974, the Louisiana Legislature passed a resolution stating that programs in metric education be established in the state. The Department of Education has approved recommendations for full implementation of the metric system in the schools within ten years. The first two years will involve planning, teacher preparation, and curriculum research. The next five years will have the metric system taught as the primary language of measurement in grades K-6, with the English system taught as a "second language." Grades 7-12 will use the metric system exclusively. The last two years will have the metric system in exclusive use in grades K-12. Both local school systems and teacher preparation courses will provide for instruction in the metric system. Preference will be given to new textbooks which utilize the metric system.

MAINE - The State Board of Education passed a resolution calling for instruction in the metric system in all schools by September 1977. The metric system will be the primary system of measurement by the 1980-81 school year. Each school system is encouraged to establish a metric planning committee; inservice workshops; selection of metrically-oriented textbooks; and selection of accurate, sturdy metric equipment. Maine is a member of a nine-state consortium which is planning for metric implementation. Currently, workshops and inservice courses are being offered around the state. A Metric Implementation Committee is writing curriculum guides.

MARYLAND - The State Board of Education passed a resolution calling for use of the metric system by 1980. In 1974, a teacher from every school attended a workshop to spread awareness of the policies. Workshops and inservice programs are now being provided at the local level and by institutions of higher learning. It is recommended that these workshops be totally metric and activity oriented.

MICHIGAN - On September 12, 1973, the State Board of Education adopted the following: ". . . that all textbooks in mathematics and science which are purchased after June 1976 shall contain the International System of Units as the dominant form of measurement; support the staff in promoting a pocket card for every Michigan child, youth, and adult on metric transition; and refer the issue of what course of action would be the most effective for introducing a metric education program in Michigan to the Council on General Education, the Council on Elementary and Secondary Education." The Michigan "Minimal Performance Objectives for Mathematics Education" has been updated to include metric units. A "Teacher's Resource Guide" has been produced and is expected to be distributed by October 1976. A grant from the U.S. Office of Education has enabled the compiling of kits of metric materials for the Regional Educational Media Centers; training of 45 Metric Educators; and a series of workshops for elementary teachers across the state.

MINNESOTA - The Department of Education has followed the guidelines for inservice training of Minnesota teachers as outlined by the Five-State Metric Consortium. Using this multiplier approach, approximately 90% of the 21,000 elementary teachers participated in metric workshops. Regional metric coordinators were trained in the workshop process. They in turn conducted workshops for district metric coordinators who conducted workshops for the teachers in their districts. Representatives of the nonpublic education sector were also invited to participate. Workshop materials developed by the Consortium were used for the workshops.

MISSISSIPPI - The State Department of Education has issued a statement which supports a plan for the gradual implementation of the metric system within the school systems. The adoption of mathematics and science books in the fall of 1976 will increase the emphasis on the metric system in those areas. The Department has been participating in the Five-State Consortium on Metric Education. In the past two years, credit courses in metric education have been offered to teachers and television programs on the metric system have been aired. The Mississippi ETV is currently developing a mini-series on metrics that is geared to the primary level.

MONTANA - The implementation of the metric system in Montana schools uses a multi-disciplinary approach which emphasizes hands-on activities. A member of a quadri-state metric consortium for teacher inservice training, Montana is training 75 leaders with metric activities appropriate for students, teachers, and parents. Several workshops have been organized and will be continuing into the fall. A metric resolution will be presented to the Board of Public Education for their approval.

NEBRASKA - On May 7, 1976, the State Board of Education passed a resolution encouraging all public schools to provide instruction in the metric system. A target date of 1980 was set for the adoption of the metric system as the primary system of measurement in the schools. The Department of Education has sponsored many workshops and inservice programs throughout the state. The Educational Television Station is broadcasting a series of ten programs on the metric system developed in Mississippi at two different times during the school year.

NEVADA - The State Department of Education has developed a metric project to include inservice training with 5100 Nevada teachers; awareness presentations for parents and citizens; and to revise the curriculum guides to reflect the metric system as the primary language of measurement. On November 30, 1973, the Nevada State Textbook Commission directed that only text materials using the metric system as the primary language of measurement will be considered for adoption by the state.

NEW HAMPSHIRE - The State Board of Education adopted a policy statement on March 20, 1974, which recommended ". . . that school districts commence programs of instruction in the metric system to assist students, teachers, parents and the citizenty generally in preparing for such forthcoming change." A set of guidelines was issued to the school districts to aid them in developing instructional programs. A Center for Measurement and Metric Education was opened in Concord to serve as a resource center and conduct workshops. In cooperation with the Department of Education, the University of New Hampshire conducted summer institutes for elementary specialists. A booklet entitled "Guidelines. . . for Metric Education: K-6" was prepared which includes objectives, bibliography, and materials. Both the Department and the University believe that the activity approach should be used for teaching measurement.

NEW JERSEY - On November 7, 1973, the State Board of Education passed a resolution which urged all school districts ". . . to initiate a program of instruction in the metric system so that it is the primary language of measurement at all levels of instruction by 1976." Representatives have conducted awareness sessions for many districts, and follow-up hands-on workshops for the teachers. The State Department of Education is also planning a program of metric awareness aimed at the general public. Two publications have been sent to each school district. These include: "Metric System Instructional and Learning Aids" and "Why the Metric System in New Jersey Education? A Rationale for Conversion." A pamphlet is also available, "Appropriate Metric Instructional and Learning Aids--Criteria for Their Identification and Selection." The New Jersey State Assembly is currently considering a resolution which would make the adoption of the metric system as the primary language of measurement mandatory.

NEW MEXICO - In 1974, the State Legislature passed a memorial requesting a cost analysis of conversion to the metric system over a ten year period. Also in that year, New Mexico participated in the Interstate Consortium on Metric Education. The guidelines from the Final Report of the Consortium are being used by the Department of Education to implement the metric system in the schools. The State Minimum Standards clearly directs schools to provide metric education at all levels of instruction. A position paper on Metric Education was adopted by the State Board of Education in December 1975. Guidelines for teachers are included in the paper, which calls for inservice training of teachers. Workshops have been in operation for the past 2½ years conducted by the Department of Education. The New Mexico Academy of Science is active in promoting metrics at the university, professional, and industrial levels. A metric program developed at the Consortium West has been accepted which will develop teacher educators (this may carry over to certifying teachers in metrication).

NEW YORK - In 1973, a committee was formed to study the possibilities for implementing the metric system into New York schools. Recommendations resulted in the forming of a Department Metric Committee which has been working to integrate the metric system into appropriate grade levels and subject areas. The Committee has sponsored over 100 workshops for teachers and developed several publications for distribution to New York teachers. These include: "Let's Use the Metric System--A Supplement to Mathematics K-6," "New York Educators and the Metric System," "Metric-Now" (for workshops), "Metrics in Education--Resource Materials," and "Ideas for a School System Introducing the Metric System" (includes guidelines for local systems, guidelines for teachers, metric activities). In January 1975, the Commissioner of Education sent a "Policy Statement on Metric Education" to all schools urging a carefully planned and coordinated changeover to metrics in the instructional program. The New York State Legislature issued a resolution in 1976 calling for instruction in the metric system in the schools, conversion of all measurement language to SI, and institutions of teacher education to provide for teaching of the metric system.

NORTH CAROLINA - For the past two years, North Carolina has been the administrative state for the Five-State Consortium on Metric Education. The report of the first year of the Consortium covered planning for metric education, selection of educational materials, inservice and preservice training, and adult education.

The second year of the project resulted in the preparation of various educational materials including a slide/tape presentation, posters, booklets, and a Metric Resource Kit made available with the cooperation of Leicestershire Learning Systems, New Gloucester, Maine. The State Board of Education adopted a resolution in December 1974 which calls for the metric system as the primary system of measurement in the schools by the 1981-82 school year. Institutions of teacher preparation must provide for teaching the metric system by the 1975-76 school year. The Department of Public Instruction has trained over 350 key personnel in the local districts. A bibliography of metric materials, "Instructional Materials for Metric Education," was prepared by the Department and distributed in conjunction with ten materials exhibits around the state. A recent Federal grant will enable the Department to establish a Metric Resource Center for North Carolina. In December 1975, an Advisory Council on Metric Education was established to develop a metrication plan for the state.

NORTH DAKOTA - The Department of Public Instruction has recommended that all schools provide instruction in the metric system as of the 1976-77 school year, with the metric system being the primary system of measurement by the 1980-81 school year. For the past three years, metric education has been introduced in all elementary schools in Bismarck in grades 1-6. Colleges and universities have been offering classes in metric education for teachers.

OHIO - On January 14, 1974, the State Board of Education passed a resolution which encouraged the schools to ". . . give increased attention to the teaching of the metric system of measurement." It further directed the State Department of Education to provide leadership to schools and to develop instructional materials for inservice programs for teachers. A series of workshops have been held since 1974 which reached key personnel in approximately 230 school districts. Two publications have been developed and distributed by the Department. "A Parent's Guide to Metric Measurement" was given to each fourth grade child to be passed on to their parents. "Let's Measure Metric" is a teacher's guide to introduce the metric system in classrooms. Two filmstrips with cassettes dealing with the history of measurement and the metric system were prepared and are available on a loan basis. The Department has sponsored displays on metric measurement at the Center of Science and Industry in Columbus and the Ohio State Fair. It is estimated that approximately 1,500,000 people have seen the displays. The Ohio General Assembly is presently considering a bill which would call for the required teaching of the metric system.

OKLAHOMA - The State Department of Education has been and will continue to conduct metric workshops for teachers throughout the state. A set of guidelines and a metric activities guide have been distributed at the workshops. Oklahoma is working with the Agency for Instructional Television in the development of a series of metric television programs. Two state universities have been active in promoting metric education through local school leaders.

OREGON - The Oregon State Board of Education has adopted a resolution directing the Oregon Department of Education to develop plans for the changeover to the metric system as the primary system of measurement in Oregon schools to be completely phased in by 1983. The Oregon Department of Education Metric Coordination Committee took part in the Interstate Consortium on Metric Education in 1974. The 23 recommendations of the Consortium cover the development and evaluation of instructional materials, plans for implementing the changeover and promoting public support, and preservice and inservice programs. The recommendations were to assist state education agencies by providing metric guidelines. A conference on May 2, 1974, of educators of all levels, leaders in business and industry, and others developed a basic philosophy for a resource handbook entitled "MEASUREMENT . . , with metric" which was published in 1974 as a field trial edition. A revised edition will be printed January 1977 and will be correlated to the Agency for Instructional Television (AIT) series, "Measure Metric." Oregon is a member of this 23-state metric education project consortium. The handbook is a guide for those planning to conduct metric education workshops. It includes measurement learning theory, technical information, and sample diagnostic-learning activities. The Oregon Department of Education has completed a one-week metric training session for 60 teachers, supervisors, and administrators. This USOE grant calls for each of the 60 persons to present one six-hour workshop for school staff and one two-hour metric orientation workshop for parents upon return to their respective school districts.

PENNSYLVANIA - On September 13, 1974, the State Board of Education established guidelines for providing instruction in the metric system. Both the metric and English systems shall be taught co-equally in science and math in the elementary schools. To aid teachers in metric instruction, the Department prepared a booklet, "A Guide to Teaching the Metric System," and another publication, "Suggested Guidelines For the Selection of Metric Instructional and Learning Aids."

PUERTO RICO - Although no definite program or policies have been set, the Department of Education is currently reviewing metric material which might be appropriate for use in the classrooms.

RHODE ISLAND - The Board of Regents for Education passed a resolution on October 17, 1974, which encourages school districts to increase their emphasis on the metric system; calls for the Department of Education to provide support and develop recommendations providing for mandatory instruction in the metric system. The recommendations which were approved by the Board of Regents on February 20, 1975, urge all schools to offer instruction in the metric system and the English system and require all such instruction be offered no later than September 1980; call upon institutions to include metric education in their teacher education programs; require Channel 36 to offer programming in metrication; require the Department to sponsor inservice training; and urge that as textbooks are replaced, the new books should deal comprehensively with both the metric and English systems.

SOUTH CAROLINA - The State Legislature is currently considering legislation regarding the metric system. Workshops for teachers are held which are sponsored by local and state personnel. A newsletter has been initiated to report on current trends and practices.

TENNESSEE - The Department of Education currently offers metric education workshops when requested by local school systems, cooperates with colleges on metric implementation projects, and provides public awareness programs. The guidelines established by the Interstate Consortium on Metric Education and the National Council of Teachers of Mathematics are being utilized. Future plans include the development of a position statement, curriculum materials, and workshops.

TEXAS - The Texas Education Agency is presently developing guidelines for implementing the metric system into schools. An inservice training packet is being developed for use with regional representatives who in turn will hold workshops in their regions. Ideas from the Interstate Consortium on Metric Education have been referred to for preparation of the training packet.

UTAH - The State Board of Education has recommended that the metric system become the primary system of measurement in the public schools. All textbooks adopted after January 1, 1979, should employ metrics when dealing with measurement. Other learning aids will be gradually converted to those that use the metric system. Inservice programs for school personnel should be presented by January 1, 1980. New teachers seeking certification as of January 1, 1980, should have received some metric instruction. Utah was a member of the Interstate Consortium on Metric Education and has adopted the recommendations of the Consortium with the exception of the "re" spelling.

VERMONT - On April 16, 1974, a resolution was adopted by the State Board of Education for establishing the metric system as the primary system of measurement in Vermont. It called for the public schools and institutions with approved programs of teacher preparation to begin implementing the system by the school year 1975-76. The Department of Education has available a booklet, "Guidelines for Metric Education in Vermont," which lists teaching suggestions for all levels. A bibliography, "Fiche-Barrel Bibliography, Number I, The Metric System," was published in cooperation with the New Hampshire Department of Education. Further, assistance will be provided to schools and districts requesting help in planning for inservice workshops.

VIRGINIA - The General Assembly adopted a resolution in 1974 calling for the assessment of the impact of implementing the metric system in public schools in Virginia. Pursuant to the legislative action, the Department of Education has taken the following stops: the adoption of textbooks which contain appropriate metric content; prospective teachers in Virginia's colleges must be trained in metric; teachers must be trained in the use of the metric system through inservice workshops; curriculum guides will use the metric system as an integral part; and conferences sponsored by the Department must incorporate metric education into their programs. The Department currently holds workshops when requested using Oregon's "Measurement with Metric" workshop as a basic reference. Two publications are available, "Prepare for a Metric Tomorrow," a brochure which has been distributed to all elementary teachers, and "In-Service Guide to Teaching Metric Measurement," which provides basic metric information, suggested teaching strategies, and suggestions for inservice programs. The Department now requires that all textbooks submitted for state adoption must include metric standards.

WASHINGTON - The Governor has appointed a metric task force made up of representatives of major state agencies. The state is participating in the Interstate Consortium on Metric Education and is involved in the production of a metric television series being produced by the Agency for Instructional Television. A handbook has been distributed to assist educators in implementing the metric system in all curriculum areas.

WEST VIRGINIA - A resolution was passed by the State Board of Education on April 11, 1975, which calls for all schools to provide instruction in the metric system as of the 1976-77 school year. The metric system shall be taught as the primary system of measurement as of the 1980-81 school year. Numerous workshops and projects are being conducted throughout the state. "Making Metric Manipulatives" is a booklet which has been prepared to be used at the workshops.

WISCONSIN - The Department of Public Instruction strongly supports metric activities in the schools and encourages the "think metric" approach rather than the conversion technique. A booklet, "Guidelines for Teaching Metric Concepts," includes objectives relative to the metric system which school districts and teacher education programs are encouraged to adopt. The Department of Public Instruction is part of a consortium of states working with the Agency for Instructional Television, Bloomington, Indiana, to produce a series of 12 television programs geared to the upper elementary grades. Working in cooperation with the University of Wisconsin, the Department has conducted inservice workshops for elementary teachers.

INSTITUTIONS AND ORGANIZATIONS INVOLVED WITH METRIC EDUCATION

Prepared by

Eileen Miller

INSTITUTIONS AND ORGANIZATIONS INVOLVED WITH METRIC EDUCATION

A number of institutions and organizations were contacted and asked to relate their activities and involvement with metric education. These have been listed along with any metric materials which have been developed by the groups.

AGENCY FOR INSTRUCTIONAL TELEVISION - Box Z, Bloomington, IN 47401. A booklet for teachers, "Metric Education," was prepared in 1974. It includes guidelines for teachers; objectives for grade levels. A series of twelve 15-minute television programs entitled "Measure-Metric" is currently in preparation. Developed for a consortium of states, the series will deal with length, area, volume, mass/weight, and temperature. Teacher's guides will be available.

AMERICAN HOME ECONOMICS ASSOCIATION - 2010 Massachusetts Avenue, N.W., Washington, DC 20036. In June 1975, the Assembly of Delegates resolved that all future publications will use the (SI) metric system. The Journal of Home Economics has featured metric articles in the past. A booklet, "Guidelines for Metric Usage in Home Economics," is now in preparation.

AMERICAN INSTITUTES FOR RESEARCH IN THE BEHAVIORAL SCIENCES - P.O. Box 1113, Palo Alto, CA 94302. A newsletter, AIR METRIGRAM, is published five times during the school year (subscription $5.50). Also available are three National Institute of Education-funded project reports: "Going Metric: An Analysis of Experiences in Five Nations and Their Implications for U.S.

Educational Planning"; "Metric Inservice Teacher Training: Learning from the English and Australian Experience"; and "Teacher Training in the Metric System: An Overview of Selected Programs in the U.S."

AMERICAN NATIONAL METRIC COUNCIL - 1625 Massachusetts Avenue, N.W., Washington, DC 20036. "A private, non-profit organization, the council serves as a planning, coordinating, and information center for metric activities in the U.S." A Metric Advisory Panel has been appointed which consists of over 75 organizations and several individuals. The Metric Practice Committee was established in 1973 to help guide metric conversion. The bi-weekly "Metric Reporter" reports on metric events in the U.S. and around the world. The Council maintains an Information Center containing over 1600 reference sources. Some metric publications are available for purchase including, "Metric Editorial Guide," which contains basic metric information.

AMERICAN SOCIETY FOR TESTING AND MATERIALS - 1916 Race Street, Philadelphia, PA 19103. The Society has several publications available dealing with the metric system. These include: "ASTM Standard for Metric Practice," "ASTM Conversion Slide Rule, U.S. Customary to SI Units," "Package of E380-76 Conversion Slide Rule," "Metrication--Managing the Industrial Transition," and "Metric Mechanical Fasteners."

ATLANTIC COAST REGIONAL METRIC EDUCATION CONFERENCE - P.O. Box 373, Amherst, MA 01002. Funded by HEW, the conference is scheduled for October 26-29, 1976, in Miami Beach, Florida. Representatives from 20 states will be attending to participate in workshops and sessions. Available commercial materials dealing with the metric system will be displayed.

CANADIAN METRIC ASSOCIATION - P.O. Box 35, Fonthill, Ontario, Canada LOS 1EO. The Association was founded in 1969 to promote the adoption of the metric system in Canada, examine its practical application, and to help educate the general public. The Association publishes a "Newsletter" four times a year and has available a series of fact sheets on the metric system. Some of the titles include: "The Metric System in a Nutshell," "Convenient Metric Units for Popular Use," "The Case for Meter and Liter," and "The Decimal System of Numbers."

CENTER FOR UNIFIED SCIENCE EDUCATION, THE - The Ohio State University, Box 3138, University Station, Columbus, OH 43210. The Center distributes a bibliography of metric material compiled from various sources.

COLLEGE OF HOME ECONOMICS - Iowa State University, Ames, IO 50010. Actively involved with the American Home Economics Association, the Iowa Student Members of AHEA planned and conducted a Retreat with the theme "Ready or Not--Metric Is Coming." They held demonstrations, hosted speakers, and engaged in various activities using metric measurements. The students continued their work throughout the year and produced two slide series on the metric system. Members of the Iowa State Home Economics Association prepared a kit, "Inching Toward Metric."

COLLEGE OF IDAHO, THE - Caldwell, ID 83605. A member of an inter-mountain consortium of nine colleges, the College of Idaho has recently received a grant from the USOE to conduct two-week workshops at each college. Thirty teachers will attend each workshop to receive metric instruction, prepare teaching materials, participate in demonstrations, and be trained to organize workshops in their own communities. The workshops are scheduled for June 1977.

COOPERATIVE EXTENSION PROGRAMS - Cornell University, Martha Van Rensselaer Hall, Ithaca, NY 14853. Although the major focus of metric education through the Extension Programs is on consumer education, Cooperative Extension Agents have assisted local school districts in the presentation of workshops for teachers. A "Metric System Resources" list has been prepared at the University.

COOPERATIVE EXTENSION SERVICE - Cook College, P.O. Box 231, New Brunswick, NJ 08903. A bibliography, "Metric Resource References," has been compiled which includes: pamphlets, reports, articles, educational kits, films, and charts.

COOPERATIVE EXTENSION SERVICE - University of Missouri, Lincoln University, Fulton, MO 65251. For the past few years the University has conducted presentations for teachers, business and industry, civic groups, and offered seminars and both credit and noncredit courses. The presentations include hands-on experiences. Materials which have been prepared include: "Think Metric" (pamphlet), "A Metric America" (bibliography), "Selected Publications on the Metric Question Which Have Appeared within Five Years" (bibliography), "Think Metric--Liter, Meter, Gram" (booklet for students), and "Basic Use of the Metric System" (booklet of worksheets for inservice training of teachers), and filmstrip/csssette series.

COOPERATIVE EXTENSION SERVICE - Virginia Polytechnic Institute and State University, 202 Wallace Annex, Blacksburg, VA 24061. Hands-on learning activities developed at the University are used to teach the metric system. A pamphlet, "Think Metric," is also distributed.

COOPERATIVE EXTENSION SERVICE - West Virginia University, Morgantown, WV 26506. A pamphlet, "And Now, A Metric USA," has been prepared at the center for distribution.

EXTENSION SERVICE, THE - University of Vermont, Burlington, VT 05401. The University has been active in preparing metric materials since 1969 when the first metric slide set was developed. An additional set has since been produced. Other efforts include a metric newsletter, TV programs, and publications.

GEORGIA CENTER FOR CONTINUING EDUCATION - University of Georgia, Athens, GA 30602. The Georgia Department of Education recently conducted a Metric Workshop at the Georgia Center.

GREAT PLAINS NATIONAL INSTRUCTIONAL TELEVISION LIBRARY - Box 80669, Lincoln, NE 68501. The Library has available a series of fifteen 20-minute lessons entitled "The Metric System," produced by the Mississippi Authority for Educational Television.

METRIC INSTITUTE, THE - The University of Alabama, Box 2967, University, AL 35486. The Institute has been active in metric education. It has served as auditor and consultant for many Title II programs in metric education conducted in Alabama. They provide inservice training for teachers, conduct lectures for civic and social groups, and aid business and industry. They are serving in the Alabama Metric Advisory Council.

METRIC STUDY INSTITUTE - P.O. Box 767, Cedar Falls, IA 50613. A nonprofit organization, the Institute serves teachers and others concerned with metric education. A publication, "Bi-Si-Metric Instructor," presents material of interest to educators.

MICHIGAN COUNCIL OF TEACHERS OF MATHEMATICS - Box 16124, Lansing, MI 48901. The Council has been actively involved with the state in developing metric objectives. They have developed training materials which will be used for workshops throughout the state. These include: "Metric Measurement Activity Cards" and "Activities for Teaching Measurement."

MICHIGAN STATE UNIVERSITY - East Lansing, MI 48823. The University has been active in working with state committees involved in implementing the metric system throughout the state. They have held seminars and courses both on and off-campus, as well as teacher and administrator workshops. They were involved in editing an issue of The Michigan School Board Journal on metric activities. A bibliography of metric materials is available for purchase entitled "A Collection of Materials and Ideas on Metric Education."

MISSISSIPPI AUTHORITY FOR EDUCATIONAL TELEVISION - P.O. Drawer 1101, Jackson, MS 39205. A series of instructional television lessons on the metric system has been developed which is currently being used in over 35 states. To accompany the series is a guide and activity masters.

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS - 1906 Association Drive, Reston, VA 22091. This association has been active in supporting the use of the metric system since 1930. A Metric Implementation Committee was established in 1973 to guide the metrication program. Assistance has been provided to various groups and organizations. Workshops are held at the Council's conventions and metric materials have been distributed to over 10,000 educators. Some available publications include: "A Metric Handbook for Teachers," "NCTM Metrication Update--9/74," "Suppliers of Metric Materials for Educators," "1--To Get Ready." Metric articles continue to appear in the Council's journals Arithmetic Teacher and Mathematics Teacher.

NATIONAL EDUCATION ASSOCIATION - 1201 - 16th Street, N.W., Washington, DC. NEA Resolution C-17, "Conversion to the Metric System," passed on November 12, 1974, supports conversion to the metric system and urges all teachers to use the system as the primary language of measurement. The resolution further supports total conversion by the year 1980. The NEA is a member of several metric associations and has participated in a number of conferences and commissions. An issue of the NEA journal, Today's Education, was devoted to metric education. The NEA has been involved in several projects relating to the development of metric education instructional materials and inservice training programs. It continues to explore the availability of grants for further work in these areas.

NATIONAL SCIENCE TEACHERS ASSOCIATION - 1742 Connecticut Avenue, N.W., Washington, DC 20009. In addition to continued support of the usage of the metric system since the organization's formation in 1944, NSTA has produced packets of metric material information, metric activity suggestions, and articles on metric system application in science teaching in its journals. Complete listings are available elsewhere in this paper.

NORTHEAST METRIC RESOURCE CENTER - University of Massachusetts, Amherst, MA 01002. The University has representation in a recently formed Northeast Metric Coordinating Council, in cooperation with five other states. The Council seeks to develop metric committees within each of these states. The Resource Center has conducted several metric workshops in the last few years for teachers at all levels.

PENNSYLVANIA STATE UNIVERSITY - Ogontz Campus, Abington, PA 19001. A newsletter, "Metric News," is published here.

PURDUE UNIVERSITY - West Lafayette, IN 47907. The Cooperative Extension Service has taught classes throughout the state on the implications of the metric system adoption. Each agent develops her own teaching modules; however, the Extension Service has available a three-panel portable exhibit. The Department of Consumer Sciences and Retailing participated in May 1976 in a national workshop sponsored by the American Home Economics Association. The Michigan Home Economists in Business have available a workshop publication, "The Metrics Are Coming." Copies are available from Mrs. Joy Schrage, Whirlpool Corporation, Benton Harbor, MI 49022.

ROCHESTER PUBLIC SCHOOLS, THE - Rochester, MN 55901. There has been participation in Rochester of inservice workshops sponsored by the State Department of Education. In addition, a film library has been set up to include films for all levels. Emphasis is placed on estimating before measuring and converting between the English and metric systems is discouraged.

SCHOOL OF HOME ECONOMICS - The University of Alabama, University, AL 35486. A position paper has recently been prepared for the U.S. Office of Education entitled "Metric Education: Home Economics." The Department of Consumer Sciences is actively involved with the American Home Economics Association which has resolved to use the SI system and has recommended the use of milliliters rather than grams for cooking measures.

UNIVERSITY OF CINCINNATI - Cincinnati, OH 45221. The University has conducted metric workshops in cooperation with the Cincinnati Board of Education. Some basic metric information materials are distributed.

UNIVERSITY OF WISCONSIN, THE - 1500 University Drive, Waukesha, WI 53186. For the past three years, metric summer courses have been held for teachers of all levels. The lessons are being placed on video tapes for use as an inservice course which will be available to universities and school districts on a national basis. An instructor's guide is being developed to accompany the tapes which will contain additional classroom material and activities.

U.S. METRIC ASSOCIATION, INC. - Sugarloaf Star Route, Boulder, CO 80302. A nonprofit organization to promote the use of the metric system in the U.S., the Association publishes the "U.S. Metric Association Newsletter" and has available a booklet "Metric Units of Measure and Style Guide." The Ohio-Kentucky-Tennessee Region chapter of the Association has conducted a workshop for elementary and middle school teachers. Slide talks have been presented to various professional groups, trade organizations, industry, and lay groups.

WESTERN MICHIGAN UNIVERSITY - Kalamazoo, MI 49008. In cooperation with the Wayne-Westland Community School District, the University is holding a Metric National Conference for Educators on November 22-24, 1976, in Dearborn, Michigan. Educators of all levels are invited to participate in workshops and presentations dealing with construction of instructional materials, teaching strategies, community education, and others. A Center for Metric Education and Studies has been formed at the University to deal with metric education and work cooperatively with the State Department of Education.

WORCESTER PUBLIC SCHOOLS - 20 Irving Street, Worcester, MA 01609. The office of the superintendent has prepared a curriculum guide, "Metric K-3." This guide is to be followed using metric measurement exclusively in grades K-3. The guide provides helpful conversion information and an extensive list of behavioral objectives. Learning will be accomplished by "doing" and estimation is promoted. The objectives are non-graded and progressive.

ANNOTATED BIBLIOGRAPHY
OF
METRIC MATERIALS

Prepared by

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and

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ANNOTATED BIBLIOGRAPHY
OF
METRIC MATERIALS

The following annotated list of metric materials were reviewed by NSTA staff members with the exception of a few items under Teacher Education Materials which were taken from Metric Education--An Annotated Bibliography for Vocational, Technical and Adult Education, prepared by The Center for Vocational Education, The Ohio State University, Columbus, Ohio.

There is a wide assortment of good metric materials on the market which were not reviewed by the NSTA staff because the items were not secured within the timespan necessary for preparation of this bibliography.

The materials in this annotated list have been divided into categories for easy identification. These include: Teacher Education Materials--materials which would be appropriate for inservice and preservice training; References for Teachers--books which contain basic metric information, history of the metric system, suggestions for implementation in classrooms; Bibliographies--a list of previously compiled bibliographies, some annotated; Kits for Students--complete programs or individual kits of assorted materials for use in the classroom; Student Activities--student workbooks, card files, masters for classroom duplication or learning centers; Games for Students--both card and board games for children; Books for Students--reference material which is appropriate for classroom use, written for students; Charts--for walls or bulletin boards; and

Audio-Visual Materials--filmstrip/cassette sets, slides, transpanencies, films.

Some of the entries are not complete due to lack of information given in the source. Some of the items reviewed were made available by the National Council for Teachers of Mathematics in Reston, Virginia.

TEACHER EDUCATION MATERIALS

Everyday Metrics. Arthur D. Fearson. 1974. 32pp. $2.50. Willow House Publishers, P.O. Box 129, Stockton, CA 95201. Individualized workbook of questions and answers. Topics include: decimals, distance, area, volume, mass, and temperature.

Individualized Laboratory Program for the Metric System, An: Teacher's Modules. William K. Esler and Michael C. Hynes. 56pp. $22.90 for 10 copies. Kent Educational Services, P.O. Box 903, Oviedo, FL 32765. Seven individualized modules. Topics include: linear measurement, area, volume, mass, force, and temperature. Activity oriented with objectives and self-tests.

Insight into Metric Measurement. E.B. Parks. 44pp. $2. Parks and Math Company, 995 Idlewood Drive, San Jose, CA 95121. Twelve-lesson workbook of lab activity sheets. Uses measurement and construction for skill building. Self-instructional, objectives stated, and check test.

Measure to Measure. 1974. Central Virginia Educational Television at WCVE-TV, Richmond, VA. (Order from) Great Plains National Instructional Television Library, Box 80669, Lincoln, NE 68501. Contains six video cassettes, five on metric education, and one teacher inservice program which assists teachers in planning. Teacher's Guide included.

Measurement and the Metric System Science Packet. 1973. $3. National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009. A compilation of 15 metric teaching aids including centimetre rulers, booklets, graph paper, decimetre box, charts, conversion tables, lesson plans, and resource listing.

Measurement and the Metric System II Science Packet. 1976. $3. National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009. A compilation of 14 metric teaching aids including centimetre cubes and instructional booklet, rulers, activity card, NBS materials, list of metric suppliers, and a parent fact guide. A Teachers' Guide is also included.

Measurement with Metric: A Resource Handbook. 1974. 4pp. Oregon State Department of Education, 942 Lancaster Drive, N.W., Salem, OR 97310. Resource guide for workshops. Includes rationale, activities, planning and conducting workshops, materials needed, and bibliography. Uses hands-on approach.

Metric Exercises. 1973. $6. National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009. This kit for teaching the metric system includes activities and exercises for different grade levels, a metric ruler, an uncalibrated thermometer, and a copy of the Metric Is Coming publication.

Metric Guide and Workshop Program, A. 44pp. $1. Orange County Department of Education, P.O. Box 11846, Santa Ana, CA 92711. Participant's guide for workshop including measurement experiences, suggested classroom activities, and references.

Metric In-Service Kit. $7.50. Leicestershire Learning Systems, Box 335, New Gloucester, ME 04240. Includes a litre cube, indoor Celsius thermometer, plastic grid, 10-cm cubes, book spring scale and mesh bag, 30-cm ruler, 150-cm tape measure, and an "In-Service Activities Guide." The Guide includes activities on length, area, volume, capacity, mass, and temperature.

Metric Lab. Charles W. Edwards. 1974. Aero Educational Products, Ltd., St. Charles, IL 60174. Individualized, activity lab covering linear measure, liquid measure, weight, and conversions. Kit includes: teacher's manual, practice forms, practice slate, ruler, measuring tape, cubes, cubic litre box, and review exercises. Kits with equipment in quantities also available.

Metric Measuring with Mr. Paper Clip. Franklin J. Kind and Forrest A. King. 1974. $360. Lamp Company, Learning & Media Products, P.O. Box 83, Columbia, MO 65201. Kit includes: 182 color slides, three audio cassettes, 15 b&w transparencies, script, Student Workbook, Teacher's Answers Book, Lesson Plans. Covers basic metric information. Includes behavioral objectives, supplemental activities, and unit test items.

Metric Survival Kit. $7.95. Enrich, Inc., 760 Kifer Road, Sunnyvale, CA 94086. Contains 30-cm hardwood ruler, 150-cm measuring tape, 10-cm x 10-cm transparent plastic grid, a calibrated 1 litre plastic container, spring scale with a mesh bag for holding items to be weighed; twenty 1 gram stacking mass pieces; a Celsius thermometer, and an inservice guide activity book. Larger kits are also available from Enrich which provide enough activities and measuring devices for an entire class.

Metric System. 1974. $276. Creative Visuals, Division of Gamco Industries, Inc., Box 1911, Big Spring, TX 79720. Includes 46 color transparencies with overlays covering units, length, area, volume, weight, and temperature. Appropriate for basic metric education or review. Teacher's manual included.

Metric System: A Programmed Approach, The. Paul F. Ploutz. 1972. 122pp. $2.95. Charles E. Merrill Publishing Company, 1300 Alum Creek Drive, Columbus, OH 43216. Workbook with answer key to word problems and suggested measuring activities. Covers metric prefixes, conversion skills, mass, and volume.

Metric System: The Universal Language of Measurement, The. 1971. $85.-$95. Pathescope Educational Films, Inc., 71 Weyman Avenue, New Rochelle, NY 10802. Six color filmstrips with cassettes or records covering basic metric information with a discussion of metric units in science laboratory. Includes teacher's manual with activities, script, and lesson evaluation.

Metric Workshop for Teachers. Don Cherrington. 1974. 32pp. $2.50. Willow House Publishers, P.O. Box 129, Stockton, CA 95201. Self-directed learning stations. Workbooks, activity guide, and instructor's manual. Includes objeccives, materials needed, and activities. Topics include: linear measure, mass, area, volume and capacity, and temperature.

Metric Workshop Package. 1973. $3. (Reference Manual, Study Guide, conversion charts.) University of Missouri at Rolla, Extension Division, Rolla, MO 65401. Six study units including objectives, study programs, and exercises. Topics include: general information, length, area, volume and capacity, mass, and temperature. Also contains metric game, references, suppliers, and workshop evaluation.

NBS Metric Kit. 1974. $2. Superintendent of Documents, Government Printing Office, Washington, DC 20402. Includes conversion card, ruler, chart of Modernized Metric System, "Some References on Metric Information," and "What About Metric."

Use and Understanding of the Metric System, The. Independent Study by Correspondence: Math 0011000. Anton Glaser. 1974. $27. The Pennsylvania State University, Continuing Education Department of Independent Study by Correspondence, 3 Shields Building, University Park, PA 16802. Noncredit, six-lesson kit, covering units, decimalization, and advice about teaching metric. Kit includes: study guide, textbook, ruler, and measuring tape.

REFERENCES FOR TEACHERS

Activities Handbook for Teaching the Metric System. Gary G. Bitter, Jerald L. Mikesell, and Kathryn Maurdeff. 1976. 378pp. Allyn and Bacon, Inc., Boston, MA 02210. Resource for workshops, inservice courses, individual study, and teacher reference. Numerous activities.

Brief History of Measurement Systems. Special Publication 304A. 1975. National Bureau of Standards, Washington, DC 20234. Four-page publication giving history of the metric system. Centerfold pictures small version of wall chart, "The Modernized Metric System."

Everyday Guide to the Metric System, An. 1976. 64pp. Science Research Associates, Inc., 259 East Erie Street, Chicago, IL 60611. Provides information on the metric system and its history. Included are some student activities.

Exploring Metric Measure--Primary Teacher's Source Book. John H. Bates, Terry J. Clifford, and Paul R. Park. 1973. 62pp. McGraw Hill-Ryerson Limited, Scarborough, Ontario, Canada. Activities accompanied by teacher notes; includes both indoor and outdoor experiences.

Going Metric. 16pp. Channing L. Bete Company, Inc., 45 Federal Street, Greenfield, MA 01301. Illustrated metric fact book stressing why metric, easy changeover, and conversion tables. Available for personalization imprints.

Going Metric Grades K-8--Guidelines for the Mathematics Teacher. Walter W. Leffin. 1975. 46pp. National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091. Sections on adoption of metric system, SI units, guidelines for teaching, and instructional materials and activities.

Household Weights and Measures. Special Publication 430. 1975. National Bureau of Standards, Washington, DC 20234. Binder card for consumers listing metric equivalents.

How to Teach Metric Now. 1973. Worcester Public Schools, 20 Irving Street, Worcester, MA 01430. Curriculum guide for grades K-6 with worksheets and coloring sheets suitable for reproduction.

How to Teach Metric: Some Ideas. Roy E. Clark. 1974. Metric Information Office, National Bureau of Standards, Washington, DC 20234. Collection of papers on effective ways to present the metric system. Includes changes in curriculum, strategies, and activities.

International (SI) Metric System and How It Works, The. Robert A. Hopkins. 1973. 282pp. $14.20. AMJ Publishing Company, P.O. Drawer L, Tarzana, CA 91356. Extensive information on basic metric and conversion charts.

International System of Units (SI), The. NBS Special Publication 330. 1974. 44pp. 80¢. U.S. Government Printing Office, Washington, DC 20402. Stock Number 003-003-01326-9. Provides complete listing and explanation of the SI units. Also contains resolutions of the General Conference of Weights and Measures.

Interstate Consortium on Metric Education--Final Report. 1975. 24pp. California State Department of Education, 721 Capitol Mall, Sacramento, CA 95814. A complete report of the consortium of 28 states and territories which was held in 1974. The report lists recommendations of the Consortium, suggestions for inservice training of teachers, and deals with the mass/weight controversy.

Let's Go Metric. Frank Donovan. 1974. 154pp. Weybright and Talley, New York, NY 10017. A basic introduction to new system of measurement. Explains origins and effects of changeover. Designed for schools and home.

Making Metric Maneuvers--A Resource Guide. Mary Miller and Toni Richardson. 1974. 106pp. Activity Resources Company, Haywood, CA 94500. Classroom tested aids for teachers and activities for children. Sections on linear, area, capacity, mass, and temperature measurements.

Metric Handbook for Teachers, A. Jon L. Higgins, editor. 1976. 128pp. $3.15. National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091. Contains sections on basic metric and measurement information, activities for introducing both teachers and students to metrics, and guidelines for teaching the metric system.

Metric Is Coming. 1973. 6pp. 75¢. National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009. An instructional aid which explains the metric system for teachers and provides introductory activities for students in elementary and junior high school.

Metric Measurements--Activities and Bulletin Boards. Cecil R. Trueblood. 1973. Instructor Curriculum Materials, Dansville, NY 14437. Guidelines for selection of instructional materials. Activities section has objectives, materials, and procedures format.

Metric Power. Richard Deming. 1974. 144pp. Thomas Nelson, Inc., Nashville, TN History of measurement, advantages of using the metric system, how metrication will affect both business and individuals. Includes conversion tables.

Metric System: A Method for Teaching, A. Clarence P. McKinley. 1973. 16pp. $2. Wicomico County Board of Education, Long Avenue, Salisbury MD 21801. Outlines method for teaching metric system. Contains hints for teachers, problems, and class exercises.

Metric System Instruction: An Interdisciplinary Approach. 1974. 158pp. $6. Larry L. Houser, Carroll County Public Schools, Box 500, Westminister, MD 21157. Teacher's guide containing instructional activity plans and student worksheets for all subject areas. Performance-based activities with evaluation. Includes audio-visual materials, directions for metric games, and bibliography.

Metric System Resource Guide. 1976. $4.50. Bureau of Educational Research and Services, College of Education, Arizona State University, Tempe, AZ 85281. Complete statement of metric implementation in public schools of Arizona. Curriculum guide. Complete annotated bibliography.

Metric System Simplified. Gerard W. Kelly. 1973. 80pp. Sterling Publishing Company, Inc., New York, NY 10016. Handbook for general reference; includes tables, formulae, and shortcuts for quick change to metric.

Metrics in the K-8 Curriculum--A Multidisciplinary Guide to Transition. A project of the Winston-Salem/Forsyth County Schools. 1976. 120pp. $4. Instructional Materials Development Center, 2720 South Main Street, Winston-Salem, NC 27107. Provides a comprehensive list of behavioral objectives, activities for students, materials and equipment, list of suppliers, and criterion-referenced student tests. Most of the material is coded and can be cross-referenced.

Neater by the Meter. Anton Glaser. 1974. 114pp. $3.50. (softbound) Anton Glaser, 1237 Whitney Road, Southampton, PA 18966. Written for non-technical persons. Oriented to needs of everyday life. Includes charts and illustrations of metric measurements of familiar terms to help metric orientation.

Report to the Congress--A Metric America--A Decision Whose Time Has Come. NBS Special Publication 345. Prepared by the U.S. Metric Study. 1971. 170pp. $2.50. U.S. Government Printing Office, Washington, DC 20402. Contains historical perspective of the metric system in the U.S. Examines considerations of "going metric" in the U.S. Provides recommendations and cost analyses.

Successful Experiences in Teaching Metric. Special Publication 441. 1976. $2.30. National Bureau of Standards, Washington, DC 20234. Series of articles pertinent to teachers. Some suggestions for activities offered.

U.S. Metric Study Interim Report--Education. NBS Special Publication 345-6. Prepared by the U.S. Metric Study. 1971. 204pp. $1.75. U.S. Government Printing Office, Washington, DC 20402. Sixth in a series of reports prepared for Congress. Examines present status of the metric system in education and discusses the problems of transition. Examines cost considerations and includes sample activities for children.

What About Metric? 16pp. 80¢. National Bureau of Standards, Washington, DC 20234. A consumer's guide to the metric system. Emphasizes conversions.

BIBLIOGRAPHIES

Bibliography of the Metric System. Compiled by John T. Milek and Valerie Antoine. 1968. 74pp. The Metric Association, Inc., 2004 Ash Street, Waukegan, IL 60085. A bibliographic listing of printed material. Not annotated. (Current address: U. S. Metric Association, Sugarloaf Star Route, Boulder, CO 80302.)

Bibliography on the Metric System: Instructional Materials. 1974. 36pp. Metric Consultant, Division of Instructional Media, Indiana Department of Public Instruction, 120 West Market Street, 10th Floor, Indianapolis, IN 46204. Annotated and indexed according to types of materials. Includes: charts, films, filmstrips, games, kits, posters, records, slides, transparencies, printed materials, government publications, and addresses of suppliers.

Catalog of Metric Instructional Materials. Edwin Carr, editor. 1974. 56pp. $1.50. Metric Students Center, American Institutes for Research, Box 1113, Palo Alto, CA 94302. Indexed according to types of materials. Includes: objectives or purpose, cost, and sources.

Collection of Materials and Ideas on . . . Metric Education, A. Julian R. Brandon. 1974. Mathematics Teaching Center, College of Education, Michigan State University, East Lansing, MI 48823. Some bibliography included, although not annotated.

Information on the Metric System and Related Fields. Ernst Lange. 1974. 274pp. $2.25. Prepared by the National Aeronautic and Space Administration, Washington, DC, George C. Marshall Space Flight Center. Obtained from: U.S. Metric Association, Sugarloaf Star Route, Boulder, CO 80302. Includes: books, reports, pamphlets, articles, periodicals, legislation, audio-visual materials, posters, training courses, hardware, consultants, and additional source addresses.

Metric Education--An Annotated Bibliography for Vocational, Technical and Adult Education. 1974. 150pp. The Center for Vocational Education, The Ohio State University, 1960 Kenny Road, Columbus, OH 43210. Comprehensive bibliography including audio-visual materials, kits, posters, teacher education material, list of suppliers, and additional resource contacts. Also available, Metric Education Bibliography, 1975.

Metric Resource References. Cooperative Extension Service, Cook College, P.O. Box 231, New Brunswick, NJ 08903. Includes: books, reports, articles, kits, films, charts, and other aids.

Metric System, The. 1974. 10pp. $1. The Baker and Taylor Company, Audio Visual Services Division, P.O. Box 230, Momence, IL 60954. Lists 90 titles of audio-visual materials. Includes: grade level, price, producers, release date, and content summary.

1--To Get Ready. 1973. American Association of School Librarians, 50 East Huron Street, Chicago, IL 60611. Pamphlet listing metric aids, audio-visual material, books, and journal articles.

2--To Get Set--A Selected Bibliography on Metrication. 1975. 60¢. Prepared by the American Association of School Librarians and the National Council of Teachers of Mathematics. Available from: American Association of School Libraries, 1201 - 16th Street, N.W., Washington, DC 20036. Resources listed for the student's shelf, the reference shelf, the professional shelf, and the parent's shelf.

Some References on Metric Information. Special Publication 389. 1975. National Bureau of Standards, Washington, DC 20234. Booklet listing NBS metric publications, commercial suppliers of metric materials, and conversion charts.

Source Book of Metric Materials and Equipment for Educators. Developed by the California State Department of Education for the Five-State Consortium on Metric Education. 78pp. Available from: California State Department of Education, 721 Capitol Mall, Sacramento, CA 95814. Listings of instructional materials for metricating schools. Includes metric measuring devices, printed and non-printed materials for all levels of instruction. Criteria for selecting materials is also included. Materials are categorized to ease selection.

Suppliers of Metric Materials for Educators. 1974. 12pp. National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091. Names and addresses of 158 metric suppliers. Indexed by grade and type of material.

KITS FOR STUDENTS

Contemporary Metric. James Haugaard and David Horlock. 1973. $7.95. Prentice-Hall Learning Systems, Inc., P.O. Box 47X, Englewood Cliffs, NJ 07632. Includes 30 task sheets, three wall charts, two binder charts dealing with place value, linear measure, area, and computations.

How to Teach Metric Now. Worcester Public Schools, Metric Committee. 1973. 74pp. $3. Charles Kolak, Executive Assistant for Public and Staff Information, Worcester Public Schools, 20 Irving Street, Worcester, MA 01609. Includes objectives and activities for K-12. Charts, tables, diagrams, and bibliography included.

LLS Metric Starter Set. $82.50. Leicestershire Learning Systems, Box 335, New Gloucester, ME 04240. Kit includes: 30 flexible plastic 1 m rulers, 100 30 cm wooden rulers, five plastic litre cubes, five sets of graduated beakers, and one inservice manual. These quantities are sufficient for getting a school started in teaching metrics.

Measuring: A Metric Approach. $317 for complete system; individual components may be purchased separately. Schloat Productions of Prentice-Hall Media, Inc., 150 White Plains Road, Tarrytown, NY 10591. A six-part program for grades K-5 to teach metric as a first language of measurement. Complete with all measuring materials needed for an average size class including a Program Overview, six color/scund filmstrips, six program guides, activity cards, rulers, tape measures, growth charts, centimetre grids, area tiles, unit cubes, volume boxes, even-arm balance, weights, and "Parent Fact Guides."

Metri Lab TM Program. 1975. Ed Media Tec., Inc., Wilkes-Barre, PA 18703. Includes teacher's guide, spirit masters, filmstrips, cassettes, manipulatives, poster, and parent pamphlets. There are seven labs in the series.

Metric Measurement Program--Primary Activity Cards. Science Research Associates, Inc., 259 East Erie Street, Chicago, IL 60611. Contains 100 activity cards, teacher's guide, two posters, spirit masters, and cassette. Can be used with Manipulatives Kit.

Metric System, The--a metric teaching program. The Seven-Up Company, Public Relations Department, 121 South Meramec Avenue, St. Louis, MO 63105. Includes: converter, height scales, posters, classroom quantity decals, and Teacher's Edition.

North Carolina Metric Resource Kit, Grades 4-6. Leicestershire Learning Systems, Box 335, New Gloucester, ME 04240. This kit was packaged by Leicestershire Learning Systems according to the specifications drawn up by the North Carolina Department of Public Instruction as a result of the Five-State Consortium on Metric Education. The comprehensive kit contains multiple quantities of rulers, trundle wheels, tape measures, plastic grids, school balances, plastic stacking masses, metal masses, spring scales, plactic cm cubes, graduated litre cubes, sets of graduated beakers, and immersible Celsius thermometers. In addition, a 20 m surveyor's tape, a height measure, a bathroom scale, and an outdoor thermometer are also included. The quality of the materials in this kit is excellent.

STUDENT ACTIVITIES

Amusements in Developing Metric Skills. Alice A. Clark and Carol H. Leitch. 1973. 48pp. Midwest Publications Company, Inc., P.O. Box 129, Troy, MI 48084. Tearsheet-workbook format featuring various types of puzzles which students solve by working conversion problems within the metric system, using operations with metric units, and solving practical application problems. Also includes a section of materials for the teacher.

Individualized Laboratory Program for Metric System--Teacher's Modules, An. 1973. Kent Educational Services, Oviedo, FL. Activities for metric linear, square, and cubic measurement, liquid, mass, force, and temperature.

Crowell Young Math Activity Cards on Measurement. $15.95. Thomas Y. Crowell Company, 666 Fifth Avenue, New York, NY 10019. A set of 32 nicely illustrated cards in a box. Some of the cards provide instructions for simple projects that children can do on their own. Set includes tool cards and information card with suggestions for teacher and parent. Metric measurement concepts are incorporated wherever they apply.

Games with Metrics. Jim Haugaard and Dave Horlock. 1974. 94pp. Prentice-Hall Learning Systems, Inc., Englewood Cliffs, NJ 07632. Collection of teacher-tested games and activities to enhance metric teaching. Pages designed for dittos and mimeograph masters.

Happy Metrics I and II--Metric Learning through High-Interest Games and Activities. Scott Resources, Inc., Box 2121, Fort Collins, CO 80522. Two looseleaf binders containing approximately 150 pages each (one for primary, one for intermediate grades). Contains a wealth of activities, cut-out constructions, games, and wall charts.

I'm OK, You're OK--Let's Go Metric. 1973. Midwest Publications Company, Inc., Troy, MI 48084. Introduces metric system through activities divided into four reading levels--no read, low read, medium read, and high read. Tear-out sheets. Most equipment needed and selected answers included at end of book.

Insight into Metric Measurement and Measuring A'La Metric. 1973. $2.95 and $4. Parks & Math Company, 954 Idlewood Drive, San Jose, CA 95121. These workbooks present assorted exercises, and activities are also included.

Metric Activity Cards. 1976. Modern Math Materials, 1658 Albemarle Way, Burlingame, CA 94010. Learning center and activity cards. Workbook, Math Metrics, and poster set available.

Measure Metric (Levels A,B,C, and D). Lola J. May and Donna Cyrier Jacobs. 1974. $1.44. Harcourt Brace Jovanovich, 757 Third Avenue, New York, NY 10017. Books A and B are intended for grades 1-4; books C and D for grades 5-8. Exercises include measuring with the cardboard rules provided, computation, drawing, graphing. Exercises are related to traditional math skills and symbols.

Metric Measurement--Activities in Linear Measurement and Activities in Capacity, Mass, and Temperature. Diana Hestwood, et al. 1974. The Math Group, Inc., 5625 Girard Avenue South, Minneapolis, MN 55419. Tear-out pages for making dittos and mimeograph masters. Designed for total metric thinking. No conversions are used.

Metric Measurement Activity Cards. (Monograph No. 4). 1974. The Michigan Council of Teachers of Mathematics, Box 16124, Lansing, MI 48901. Ungraded cards provided in booklet which can be cut out and laminated for a kit. Some worksheets included.

My Metric Measurement Manual. Frederic Willert. Student's Edition, $2; Teacher's Edition $3.75. Pauper Press, Box 303, Two Rivers, WI 54241. Cartoon approach to linear metric measuring designed for primary and intermediate grades. The nongraded workbook features a fantasy story with Metric Man, Bird, and Dog with measurement problems on alternate pages. Teacher's Edition includes teaching suggestions, activities, and tests.

Practice in Measuring with Metrics. Cecil R. Trueblood. 1974. Instructor Curriculum Materials, Dansville, NY. Duplicating masters for individual or group study at primary/middle levels.

Think Metric--Measuring Weight Activity Cards. 1974. Weber Costello Company, 1900 North Narragansett Avenue, Chicago, IL 60639. Cardboard 8 x 12 poster cards.

GAMES FOR STUDENTS

Decimeter. 1974. $11. The Lawhead Press, Inc., 900 East State Street, Athens, OH 45701. Game board using cards which pose metric questions.

Match A Gram, Match A Meter, Match A Liter. The Math Group, Inc., 5625 Girard Avenue South, Minneapolis, MN 55419. Three card games designed for 2-4 players. The object is to match sets composed of a metric unit, an equivalent unit, and a matching object.

Metric Bingo. 1974. $4. Dek-A-Music Company, La Porte, IN 46350. Set of cards using metric symbols in place of numbers. Clues are read and students mark correct square with a chip.

Metric Playing Cards. $2. Dek-A-Music Company, La Porte, IN 46350. Designed for playing common games such as war, solitaire, poker, etc. Patterned after regular deck but using metric symbols. Brief explanation of metric unit provided on cards.

Metrication. Metrix Corporation, Box 19101, Orlando, FL 32814. Board game with dice and "metric money." Players purchase lots, pay rents, etc. For age 10 and up.

Path to Metrics--Intermediate Math Games. Milton Bradley Company, Springfield, MA 01101. Board game with spinner and cards posing metric questions. Players who answer correctly move ahead.

AUDIO-VISUAL MATERIALS

Introducing the Metric System and Picturing Metrics. BFA Educational Media, 2211 Michigan Avenue, Santa Monica, CA 90406. Includes four filmstrips, four cassettes per set. These sets come with sets of activity cards for students to complete independently after viewing the filmstrips.

Metric System, The. Perennial Education, P.O. Box 236, Northfield, IL 60093. A series of four films entitled "Meters, Liters and Kilograms;" "The Meter;" "The Liter;" and "The Kilogram." These films are designed for upper elementary and junior high school. Activities in the films are engagingly performed by children who are themselves learning the metric system. There are two films in "The Kilogram" series; one uses the term "mass" and the other uses "weight." Teachers may order according to their individual preference. Rental and purchase information available upon request.

Metric System, The. 1975. United Transparencies, Inc., P.O. Box 688, Binghamton, NY 13902. Single color transparencies. Introduction to the metric system showing units, familiar objects measured metrically, and equivalents. Teacher's guide.

Metric System Teaching Tapes. Houghton Mifflin Company, One Beacon Street, Boston, MA 02107. Includes six cassettes and accompanying worksheets in binder. Teaches basic metric facts. Teacher's guide. For grades 3-8.

Scholastic Dimension--A Multi-Media Learning Unit. Scholastic Book Services, 904 Sylvan Avenue, Englewood Cliffs, NJ 07632. Kit includes: filmstrip, cassette, and record entitled "The Metric Olympics;" 32 student activity cards featuring long-term projects; "Metricks" card game; "Make-A-Meter" spirit master for constructing metre sticks; 7 spirit masters; large color poster; and teacher's guide.

Situational Math--Using the Metric System. Problem-Solving/Computation. 1974. United Learning, 6633 West Howard Street, Niles, IL 60648. A set of six filmstrips and cassettes to help students use the metric system for solving word problems and applying computational skills. Teacher's guide contains student activities for duplication. Wall chart included.

Think Metric: Understanding and Using the Metric System. 1973. Denoyer-Geppert Audio-Visuals, 5235 North Ravenswood Avenue, Chicago, IL 60640. Contains 80 slides in carousel cartridge. Compares metrics to familiar situations and objects. Junior high and up.

Transparencies. Creative Visuals, P.O. Box 1911, Big Spring, TX 79720. Series of color transparencies showing metric units, equivalents, conversions, etc. Teacher's Guide.

Tutorette--Measure Up--Metrically. Audiotronics, P.O. Box 3997, North Hollywood, CA 91601. Includes 90 audiocards for teaching meaning, pronunciation, spelling, and symbols of the metric system. Four activity sheets. Teacher's guide.

BOOKS FOR STUDENTS

Exploring with Metrics. Gary G. Bitter and Thomas H. Metos. 1975. 62pp. Julian Messner, One West 39th Street, New York, NY 10018. Description of history and basics of metric system. More than half the book is devoted to using the metric system. Explorations and activities for upper elementary grades.

Measure with Metric. Franklyn M. Branley. 1975. 34pp. Thomas Y. Crowell Company, 666 Fifth Avenue, New York, NY 10019. Simple construction projects using easily available materials. For intermediate elementary grades.

Merry Metric Cookbook. Mary Miller and Toni Richardson. 1974. 28pp. Activity Resources Company, Inc., P.O. Box 4875, Haywood, CA 94540. Uses nursery rhymes and "Alice in Wonderland" characters to establish metric voacbulary. Stresses gram for measuring mass and millilitre for measuring capacity.

Meters, Liters, and Grams. Kay and Bob Nation. 1975. 64pp. Hawthorn Books, Inc., Publishers, 260 Madison Avenue, New York, NY 10016. Easy to understand introduction to metric system. Two 12-year-old children perform activities including preparing recipes. For upper elementary and junior high.

Think Metric. Franklyn M. Branley. 1972. 52pp. Thomas Y. Crowell Company, 666 Fifth Avenue, New York, NY 10019. Colorfully illustrated account with history of measurement, measurement exercises, and a set of English-metric conversion charts. For intermediate and upper elementary grades.

Think Metrics--A Basic Guide to the Metric System. F.O. Armbruster. 1974. 40pp. Troubador Press, 385 Fremont Street, San Francisco, CA 94105. This book presents the metric system graphically. Included are several activities and constructions for the student.

CHARTS

All You Will Need to Know About Metric. Letter Circular 1052. 1974. National Bureau of Standards, Washington, DC 20234. Wall chart showing common metric units.

Measure with the Metric System. $2.50. Scholastic Magazines, Inc., Reader's Choice, 904 Sylvan Avenue, Englewood Cliffs NJ 07632. Color, 73 x 106 cm chart pictorially describes metre, litre, gram, area, and volume.

Metric Conversion Factors. Letter Circular 1051. National Bureau of Standards, Washington, DC 20234. Binder chart listing conversions from the English to the metric system.

Metric Place Value Chart. $2.80. Ideal School Supply Company, 11000 South Lavergne Avenue, Oak Lawn, IL 60453. Color chart shows meaning of metre, litre, gram, and relationship of decimal point. Directions included.

Metric System, The. 1974. $3.95. Instructor Publications, Inc., P.O. Box 6108, Duluth, MN 55806. A set of 13 color charts providing basic metric information. Suggested classroom activities included.

Modernized Metric System, The. NBS Special Publication 304. 55¢. National Bureau of Standards, Washington, DC 20234. Wall chart in color giving definition of metric units, conversions, multiples, and prefixes.

HARDWARE

GREAT IDEAS, INC., P.O. Box 274, Commack, NY 11725. Wooden models of centimetres, decimetres, and square decimetres.

OHAUS SCALE CORPORATION, 29 Hanover Road, Florham Park, NJ 07932. Scales and measuring tools.

ROE INTERNATIONAL, INC., 217 River Avenue, Patchogue, NY 11772. Measuring tapes.

SCALES, P.O. Box 806, Rockford, IL 61105. Spring scales.

SCIENCE RESEARCH ASSOCIATES, INC., 259 East Erie Street, Chicago, IL 60611. Metric Measurement Program Manipulatives Kit includes: balance scale, mass measures, centimetre cubes, tapes, thermometer, grid paper. Can be used with Primary Activity Cards.

METRIC SUPPLIERS

Prepared by

Marily DeWall

and

Eileen Miller

METRIC SUPPLIERS

This master list includes several commercial suppliers whose materials and/or catalogues have been reviewed as well as those organizations and educational institutions who have developed various metric materials and aids mentioned elsewhere in this paper.

AAKRON RULE CORPORATION, 59 Hoag Avenue, Akron, NY 14001.
Metre sticks, metric rules

ACME UNITED CORPORATION, 100 Hicks Street, Bridgeport, CT 06609.
Measuring instruments

ACTIVITY RESOURCES COMPANY, INC., Box 4875, Hayward, CA 94545.
Metric blocks, activity books, manipulatives kit, posters, cookbook, activity cards

ADDISON-WESLEY PUBLISHING COMPANY, 2725 Sand Hill Road, Menlo Park, CA 94025. Filmstrips / cassettes, kits, spirit masters, activity cards, hardware

AERO EDUCATIONAL PRODUCTS, LTD., P.O. Box 71, St. Charles, IL 60174. Mini- and Multi-Metric Learning Labs contain practice slates, practice cards, centimetre rules, meter tapes, cubic centimetre blocks, liter folding boxes, teacher's manual

AGENCY FOR INSTRUCTIONAL TELEVISION, Box Z, Bloomington, IN 47401. Series of twelve television programs with teacher's guides.

AIMS INSTRUCTIONAL MEDIA SERVICES, INC., 626 Justin Avenue, Glendale, CA 91201. Films, filmstrips

ALLYN AND BACON, INC., 470 Atlantic Avenue, Boston, MA 02210.
"Understanding the Metric System," a programmed text for individualized instruction

AMERICAN ASSOCIATION OF SCHOOL LIBRARIANS, 50 East Huron Street, Chicago, IL 60611. Bibliographies

AMERICAN EDUCATIONAL FILMS, 132 Lasky Drive, Beverly Hills, CA 90212. Film

AMERICAN HOME ECONOMICS ASSOCIATION, 2010 Massachusetts Avenue, N.W., Washington, DC 20036. Association journal, booklet

AMERICAN INSTITUTES FOR RESEARCH, Metric Students Center, Box 1113, Palo Alto, CA 94302. Indexed bibliography, project reports, newsletter

AMERICAN NATIONAL METRIC COUNCIL, 1625 Massachusetts Avenue, N.W., Washington, DC 20036. Newsletter, reference material

AMERICAN SOCIETY FOR TESTING AND MATERIALS, 1916 Race Street, Philadelphia, PA 19103. Publications, slide rules

AMJ PUBLISHING COMPANY, P.O. Drawer L, Tarzana, CA 91356. Reference books, converters, charts, constructions, journal for teachers, booklet

AUDIOTRONICS, P.O. Box 3997, North Hollywood, CA 91601. Audiocards with activity sheets

A/V INSTRUCTION SYSTEMS, P.O. Box 191, Somers, CT 06071. Charts, units (slides, objectives, workbooks, transparencies)

A. BALLA & COMPANY, 2078 Integrity Drive, North, Columbus, OH 43209. Good quality centimetre cubes including super cubes, plastic and aluminum metric rulers in various lengths, personal scale, tape measures, cardboard decimetre box

BAKER AND TAYLOR COMPANY, THE, Audio Visual Services Division, P.O. Box 230, Momence, IL 60954. Audio-visual bibliography

BARR FILMS, P.O. Box 5667, Pasadena, CA 91107. Film series

BELL & HOWELL, Audio-Visual Products Division, 7100 North McCormick Road, Chicago, IL 60645. Metric Languagemaster Programs

CHANNING L. BETE COMPANY, INC., 45 Federal Street, Greenfield, MA 01301. Booklets

BFA EDUCATIONAL MEDIA, 2211 Michigan Avenue, Santa Monica, CA 90406. Films, filmstrip/cassette series with activity cards

BILLIAN COMPANY, Department SC, Box 8504, Station A, Greenville, SC 29604. Pocket converters

R. W. BRUCE COMPANY, Educational Division, Department B, 1401 Mount Royal Avenue, Baltimore, MD 21217. Filmstrip sets (worksheets, guide)

BUREAU OF EDUCATIONAL RESEARCH AND SERVICES, College of Education, Arizona State University, Tempe, AZ 85281. Curriculum guide with bibliography

C-THRU RULER COMPANY, THE, 6 Britton Drive, Bloomfield, CT 06002. Measurement instruments

CALIFORNIA STATE DEPARTMENT OF EDUCATION, 721 Capitol Mall, Sacramento, CA 95814. Final report on Interstate Consortium, bibliography

CANADIAN METRIC ASSOCIATION, P.O. Box 35, Fonthills, Ontario, Canada, LOS 1EO. Newsletter, series of fact sheets

CARROLL COUNTY BOARD OF EDUCATION, Carroll County Public Schools, Box 500, Westminister, MD 21157. Teacher's guide

CENTER FOR UNIFIED SCIENCE EDUCATION, THE, The Ohio State University, Box 3138, University Station, Columbus, OH 43210. Bibliography of metric material

CENTER FOR VOCATIONAL EDUCATION, THE, The Ohio State University, 1960 Kenny Road, Columbus, OH 43210. Bibliography

CLEARVUE, INC., 6666 North Oliphant Avenue, Chicago, IL 60631. Filmstrip/cassette sets (filmstrips for all subject areas use metrics when measurement is mentioned), book

COOPERATIVE EXTENSION SERVICE, Cook College, P.O. Box 231, New Brunswick, NJ 08903. Bibliography of metric material

COOPERATIVE EXTENSION SERVICE, University of Missouri, Lincoln University, Fulton, MO 65251. Pamphlets, bibliography, student workbooks, in-service training worksheets, filmstrip/cassette series

COOPERATIVE EXTENSION SERVICE, Virginia Polytechnic Institute and State University, 202 Wallace Annex, Blacksburg, VA 24061. Pamphlet

COOPERATIVE EXTENSION SERVICE, West Virginia University, Morgantown, WV 26506. Pamphlet

CORONET INSTRUCTIONAL MEDIA, 65 East South Water Street, Chicago, IL 60601. Kit which includes filmstrip, audio-cassette, activity cards, worksheets, and measuring tools; film, filmstrips and cassettes

CREATIVE LEARNING, 19 Market Street, Warren, RI 02885. Kit including filmstrips/cassettes, teacher's guide, spirit masters, scripts

CREATIVE PUBLICATIONS, 3977 East Bayshore Road, P.O. Box 10328, Palo Alto, CA 94303. Metric Multibase Arithmetic Blocks, kits, games, activity cards, rulers, tapes, calipers, beakers, scales, thermometers, grids, metric Geoblocks, resource books

CREATIVE TEACHING PRESS, INC., 1900 Tyler Avenue, Suite 22, South El Monte, CA 91733. Activity Cards

CREATIVE VISUALS, DIVISION OF GAMCO INDUSTRIES, INC., Box 1911, Big Spring, TX 79720. Metric education slides and guides

THOMAS Y. CROWELL COMPANY, 666 Fifth Avenue, New York, NY 10019. Books for students

CUISENAIRE COMPANY OF AMERICA, 12 Church Street, New Rochelle, NY 10805. Cuisenaire rods, metric activities kit, books, scales, centimetre cubes, mass sets, tapes and other manipulatives

DAVIDSON FILMS, INC., 3701 Buchanan Street, San Francisco, CA 94123. Films with guide and activities

DEK-A-MUSIC COMPANY, 355 West Chateau Drive, Laporte, IN 46350. Games

DICK BLICK, P.O. Box 1267, Galesburg, IL 61401. Films, hardware, manipulatives kit, puzzles, games

ED MEDIA TEC., INC., Wilkes-Barre, PA 18703. Kits

EDUCATIONAL ACTIVITIES, INC., P.O. Box 392, Freeport, NY 11520. Record/cassette sets with ditto masters and guides

EDUCATIONAL PROJECTIONS COMPANY, 3070 Lake Terrace, Glenview, IL 60025. Series of 12 filmstrips with scoring pad, answer key, and Teacher's Manual

EDUCATIONAL RESEARCH COUNCIL OF AMERICA, Rockefeller Building, 614 West Superior, Cleveland, OH 44113. Unified Science Program with a unit on metric

EDUCATIONAL SYSTEMS GROUP, THE, Union Carbide Corporation, P.O. Box 363, Tuxedo, NY 10987. Booklet, wall charts, converters, kit

EDUCATIONAL TEACHING AIDS, 159 West Kinzie Street, Chicago, IL 60610. Kits, activity cards, workbooks, books, spirit masters, charts, converters

ENCYCLOPAEDIA BRITANNICA EDUCATIONAL CORPORATION, 425 North Michigan Avenue, Chicago, IL 60611. Filmstrip series, book set with records

ENRICH, INC., 760 Kifer Road, Sunnyvale, CA 94086. Labs, kits, measuring instruments, hardware

EXTENSION SERVICE, THE, University of Vermont, Burlington , VT 05401. Newsletter, slide set, publications

EYE GATE HOUSE, 146-01 Archer Avenue, Jamaica, NY 11435. Transparency Quickstrips, filmstrips with cassettes

FILMS INCORPORATED, 1144 Wilmette Avenue, Wilmette, IL 60091. Film, "The Metric System"

GINN AND COMPANY, 191 Spring Street, Lexington, MA 02173. SAPA Metric Cluster designed for 6-12 year olds

ANTON GLASER, 1237 Whitney Road, Southampton, PA 18966. Book

GOLDSTAR METRIC CONVERSION AIDS, 3 Parkway Center, Suite 109, Pittsburgh, PA 15220. Conversion tables and charts

GRAPHIC CALCULATOR COMPANY, 234 James Street, Barrington, IL 60010. Metric converters, slide rules

GREAT PLAINS NATIONAL INSTRUCTIONAL TELEVISION LIBRARY, Box 80669, Lincoln, NE 69501. Series of fifteen televised lessons

GREAT IDEAS, INC., P.O. Box 274, Commack, NY 11725. Activity cards, games, manipulatives, wooden models of cubic centimetres, cubic decimetres, bolocks, games, spirit masters, workbooks

GUIDANCE ASSOCIATES, 757 Third Avenue, New York, NY 10017. Filmstrips/cassettes

E. M. HALE AND COMPANY, Chippewa Falls, WI 54729. Study prints

J. L. HAMMETT COMPANY, Hammett Place, Braintree, MA 02184. Hardware, games, activities, spirit masters, kits, labs, puzzles, charts, mobiles

HAWTHORN BOOKS, INC., PUBLISHERS, 260 Madison Avenue, New York, NY 10016. Books for students

D. C. HEATH AND COMPANY, 125 Spring Street, Lexington, MA 02173. Metric sections in Heath Mathematics text series (levels 1-8), 14-page reproducible activity book (grades 1-5)

HOUGHTON MIFFLIN COMPANY, One Beacon Street, Boston, MA 02107. Centimetre Rod Activity Card Kit, Teaching Tapes, filmloops

IDEAL SCHOOL SUPPLY COMPANY, 11000 South Lavergne Avenue, Oak Lawn, IL 60453. Games, metric math puzzle dials, charts, scales, mass pieces, height chart, tapes, rulers, centimetre cubes, drawing instruments, volume set

IMPERIAL INTERNATIONAL LEARNING CORPORATION, P.O. Box 548, Kanakee, IL 60901. Labs (activities, booklets, filmstrip, game, manipulatives)

INDIANA DEPARTMENT OF PUBLIC INSTRUCTION, Metric Consultant, 120 West Market Street, 10th floor, Indianapolis, IN 46204. Annotated bibliography

INQUIRY AUDIO-VISUALS (DENOYER-GEPPERT), 1754 West Farragut Avenue, Chicago, IL 60640. Metric slide programs

INSTRUCTO/McGRAW-HILL, Cedar Hollow Road, Paoli, PA 19301 Learning centers, hardware

INSTRUCTOR CURRICULUM MATERIALS, Instructor Park, Dansville, NY 14437 Poster sets, spirit masters, activities

INSTRUCTOR PUBLICATIONS, INC., P.O. Box 6108, Duluth, MN 55806. Charts

J. J. KELLER & ASSOCIATES, INC., 145 West Wisconsion Avenue, Neenah, WI. Booklets

KENT EDUCATIONAL SERVICES, P.O. Box 903, Oviedo, FL 32765. Games, learning centers, rulers, student's modules, teacher's modules

LAIDLAW BROTHERS, A DIVISION OF DOUBLEDAY, THATCHER AND MADISON, River Forest, IL 60305. Student booklets

LAMP COMPANY, LEARNING AND MEDIA PRODUCTS, P.O. Box 83, Columbia, MO 65201. Kits of metric education material with teacher guides

LaPINE SCIENTIFIC COMPANY, 6001 South Knox Avenue, Chicago, IL 60629. Charts, workbooks, rulers, games, metric measurement poster and activity cards, picture story poster cards, free handbook of metric activities and exercises, sound filmstrips, tape cassettes, playing cards, volume sets, capacity measures, metric study kits

HENRY LAVIN ASSOCIATES, INC., 12 Promontory Drive, Cheshire, CT 06410. Conversion glossary.

LAWHEAD PRESS, INC., THE, 900 East State Street, Athens, OH 45701. Game

LEICESTERSHIRE LEARNING SYSTEMS, Box 335, New Gloucester, ME 04240. In-service kits of hardware with teaching guide for all levels

LIBRARY FILMSTRIP CENTER, 3033 Aloma, Wichita, KA 67211. Filmstrips, charts, booklets, measuring instruments

LUFKIN, THE COOPER GROUP, P.O. Box 728, Apex, NC. Comic book

MATH GROUP, INC., THE, 5625 Girard Avenue South, Minneapolis, MN 55419. Activity book masters

MATHEMATICS TEACHING CENTER, College of Education, Michigan State University, East Lansing, MI 48823. Bibliography

MATH-MASTER, P.O. Box 1911, Big Spring, TX 79720. Ref-O-Metric posters, transparencies, pacers, manipulatives, kits, pocket metric converter, filmstrips, cassettes, portable desk tops, volume demonstration kits, activity cards, books

McCORMICK-MATHERS PUBLISHING COMPANY, 300 Pike Street, Cincinnati, OH 45202. Text with metric section

McGRAW-HILL BOOK COMPANY, Hightstown, NJ 08520. 3-book Metric Measure series

CHARLES E. MERRILL PUBLISHING COMPANY, 1300 Alum Creek Drive, Columbus, OH 43216. Kit (activity cards, filmstrips, study guide, manipulatives)

JULIAN MESSNER, 1 West 39th Street, New York, NY 10018. Book for students

METRIC ASSOCIATION, INC., THE, 2004 Ash Street, Waukegan, IL 60085. Bibliography

METRIC CONSULTANTS, 21720 West North Avenue, Brookfield, WI 53005. Slides, booklets, films, transparencies, filmloops

METRIC MEDIA BOOK PUBLISHERS, P.O. Box 266, Somers, NY 10589. Books for students and teachers, charts and posters

METRIC STUDY INSTITUTE, P.O. Box 767, Cedar Falls, IA 50613. Publication

METRIX CORPORATION, P.O. Box 19101, Orlando, FL 32814. Games, T-shirts

MICHIGAN COUNCIL OF TEACHERS OF MATHEMATICS, THE, Box 16124, Lansing, MI 48901. Activity booklet

MICHIGAN HOME ECONOMISTS IN BUSINESS, c/o Mrs. Joy Schrage, Whirlpool Corporation, Benton Harbor, MI 49022. Workshop publication

MIDWEST PUBLICATIONS, P.O. Box 129, Troy, MI 48084. Activity books, cookbook, mass measures

MILTON BRADLEY COMPANY, Springfield, MA 01101. Charts, units, hardware

MISSISSIPPI AUTHORITY FOR EDUCATIONAL TELEVISION, P.O. Drawer 1101, Jackson, MS 39205. Series of fifteen televised lessons with guide and activity masters

MODERN MATH MATERIALS, 1658 Albemarle Way, Burlingame, CA 94010. Workbooks, posters, kit (book, posters, activity cards, learning center signs)

MOYER VICO LTD., 700 Saint George Boulevard, Moncton, New Brunswick, Canada E1C 8M7. Metric instruments, hardware for both indoors and out, paper accessories

MULTI-MEDIA PUBLISHING, INC., 1393 South Inca Street, Denver, CO 80223. Self-instructional program for teachers (filmstrips/slides, workbooks, manuals)

NATIONAL BUREAU OF STANDARDS, Washington, D.C. 20234. Publications, posters, pocket cards, rulers, charts, kits

NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS, 1906 Association Drive, Reston, VA 22091. Publications, booklets, commercial suppliers

NATIONAL MICROGRAPHICS ASSOCIATION, 8729 Colesville Road, Silver Spring, MD 20910. Slide rule computer and posters

NATIONAL SCIENCE TEACHER ASSOCIATION, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009. Packets of material, journals featuring metric articles

OHAUS SCALE CORPORATION, 29 Hanover Road, Florham Park, NJ 07932. Scales, rulers, thermometers, and other hardware

ORANGE COUNTY DEPARTMENT OF EDUCATION, P.O. Box 11846, Santa Ana, CA 92711. "A Metric Workbook for Teachers of Consumer & Homemaking Education"

OREGON STATE DEPARTMENT OF EDUCATION, 942 Lancaster Drive, N.W., Salem, OR 97310. Resource handbook

PARKS AND MATH COMPANY, 995 Idlewood Drive, San Jose, CA 95121. Workbooks

PATHESCOPE EDUCATIONAL FILMS, INC., 71 Weyman Avenue, New Rochelle, NY 10802. Filmstrips, cassettes, guides

PAUPER PRESS, Box 303, Two Rivers, WI 54241. Workbooks

PENINSULAR SLATE COMPANY, Audio Visual Division, 2222 Stephenson Highway, Troy, MI 48084. Multimedia kits, manipulatives, "how-to" book for teachers, filmstrip series, activity cards

PENNSULVANIA STATE UNIVERSITY, Continuing Education Department, 3 Shield Building, University Park, PA 16802. Kit with guide, text, hardware

PENNSYLVANIA STATE UNIVERSITY, Ogontz Campus, Abington, PA 19001. Newsletter

PERENNIAL EDUCATION, P.O. Box 236 Northfield, IL 60093. Filmseries

PERRYGRAF, DIVISION OF NASHUA CORPORATION, 2215 Colby Avenue, Los Angeles, CA 90064. Conversion slide-charts, calculators

PRENTICE-HALL MEDIA, INC., 150 White Plains Road, Taryytown, NY 10501. Kits, film with workbooks (teacher training

PRINDLE, WEBER & SCHMIDT, INC., 20 Newbury Street, Boston, MA 02166. Book for preservice and inservice elementary classroom teachers accompanied with 200 activity cards

RANDOM HOUSE, INC., 400 Hahn Road, Westminster, MD 21157. Self-contained activity-oriented workbook program (grades 3-8), annotated teachers' editions for each grade

RESERACH ASSOCIATES, P.O. Box 13237, Gainesville, FL 32604. Metric converter

ROCHESTER PUBLIC SCHOOLS, THE, Rochester, MN 55901. Metric Film library.

ROE INTERNATIONAL, INC., 217 River Avenue, Patchoque, NY 11772. Measuring tapes and rulers

SALES AIDS, INC., 201 Bear Hill Road, Waltham, MA 02154. Metric converter

SARGENT-WELCH SCIENTIFIC COMPANY, 7300 North Linder Avenue, Skokie, IL 60076. Charts, booklets, converters, filmstrips, slides, kits, instruments, hardware

SCALES, P.O. Box 806, Rockford, IL 61105. Spring scales

SCHOLASTIC BOOK SERVICES, 904 Sylvan Avenue, Englewood Cliffs, NJ 07632. Going Metric Dimension Unit (sound/filmstrip, games, activity cards, multimedia component, Teaching Guide, books)

SCIENCE RESEARCH ASSOCIATES, INC., 259 East Erie Street, Chicago, IL 60611. A complete Metric Measurement Program, grades 1-6 (activity cards, manipulatives kit, audio cassettes with worksheets and tests, spirit masters)

SCOTT FORESMAN AND COMPANY, 1900 East Lake Avenue, Glenview, IL 60025. Student booklets which include activities, texts, workbooks

SCOTT RESOURCES, INC., 1900 East Lincoln, Box 2121, Fort Collins, CO 80522. Reproducible resource books, color cube activities, Metric Madness ungraded activities book

SELECTIVE EDUCATIONAL EQUIPMENT, INC., 3 Bridge Street, Newton, MA 02195. Instruments and hardware, spirit masters, games, activity cards, books, units

SETSCO EDUCATIONAL LTD., 1315 West 71st Avenue, Vancouver, B.C. V6P 3B3, Canada. Grid paper, books, games, linear measures, centimetre cubes, metric weights, capacity/volume measure scales, thermometers

THE SEVEN-UP COMPANY, Public Relations Department, 121 South Meramec Avenue, St. Luois, MO 63105. Kits.

SILVER BURDETT COMPANY, 250 James Street, Morristown, NJ 07960.
Spirit masters, labs, textbooks

SOCIETY OF MANUFACTURING ENGINEERS, Dearborn, MI. Bibliography

SPECTRUM EDUCATIONAL SUPPLIES, LTD., 8 Denison Street, Markham,
Ontario, Canada L3R 2P2. Metric instruments and other hardware, kits

STEPHEN BOSUSTOW PRODUCTIONS, 1649 Eleventh Street, Santa Monica, CA
90404. Film

STERLING PLASTICS, Sheffield Street, Mountainside, NJ 07092.
Measuring instruments, converters

STERLING PUBLISHING COMPANY, INC., New York, NY 10016. Handbook

SWANI PUBLISHING COMPANY, P.O. Box 248, Roscoe, IL 61073. Films,
booklets, slides/filmstrips with cassettes, posters, kit, converters,
some hardware, journal

TEACHERS, P.O. Box 398, Manhattan Beach, CA 90266. Activity books
and cards, Poster-Games

TEACHING RESOURCES FILMS, 2 Kisco Plaza, Mt. Kisco, NY 10549.
Filmstrip/cassette series

TELEX COMMUNICATIONS, INC., 9600 Aldrich Avenue, South Minneapolis,
MN 55420. Anglo-metric converter

TROUBADOR PRESS, 385 Fremont, San Francisco, CA 94105. Student
activity book

UNITED LEARNING, 6633 West Howard Street, Niles, IL 60648. Filmstrips/
cassettes with wall chart and activities

UNITED TRANSPARENCIES, INC., P.O. Box 688, Binghamton, NY 13902.
Transparencies

UNIVERSAL SUPPLY COMPANY, 1561 North Bonnie Beach Place, Los Angeles,
CA 90063. Scale rulers, converters

UNIVERSITY OF CINCINNATI, Cincinnati, OH 45221. Metric information
materials for workshops

UNIVERSITY OF MISSOURI, EXTENSION DIVISION, Rolla, MO 65401. Reference
manual, study guide, charts

UNIVERSITY OF WISCONSIN, THE, 1500 University Drive, Waukesha, WI 53186.
Video-taped lessons for in-service training with guide and activities

U.S. METRIC ASSOCIATION, Sugarloaf Star Route, Boulder, CO 80302. Bibliography, newsletter, booklet, charts, measuring instruments

VARI-VUE INTERNATIONAL, INC., 650 South Columbus Avenue, Mt. Vernon, NY 10550. Converters

VOGEL BOOK COMPANY, P.O. Box 103, Bellevue, WA 98009. Book

WEBER COSTELLO, 1900 North Narragansett, Chicago, IL 60639. Kits, filmstrips, activities, spirit masters, hardware

WESTERN LEARNING LABORATORIES, P.O. Box 284, Culver City, CA 90230. Playing cards, games, cookbook, activity cards, handbook, metric laboratory, puzzle books, multimedia kits

WEYBRIGHT AND TALLEY, New York, NY 10017. Book

WICOMICO COUNTY BOARD OF EDUCATION, Long Avenue, Salisbury, MD 21801. Booklet for teachers

WILLOW HOUSE PUBLISHERS, P.O. Box 129, Stockton, CA 95201. Metric workbooks

WINSTON-SALEM/FORSYTH COUNTY SCHOOLS, Instructional Materials Development Center, 2720 South Main Street, Winston-Salem, NC 27107. Curriculum guide (grades K-8)

WORCESTER PUBLIC SCHOOLS, 20 Irving Street, Worcester, MA 01609

APPENDIX

BIBLIOGRAPHY OF ARTICLES ON METRIC EDUCATION

Appearing in NSTA Periodicals

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Branscomb, Lewis M., "The U. S. Metric Study." *The Science Teacher*, 38:58, November 1971.

Brown, V. K., " A System of Measurement Evolved in the Classroom." *Science and Children* 1:14, February 1964.

DeRose, James V. "What Does It Mean To Measure?" *Science and Children*, 4:35; April 1967.

Ferguson, Thomas A. and Susan O. Repass, "Developing a Measurement Unit for Primary Children." *Science and Children* 12:31, March 1975.

Hayes, Michael S.,"Motivating Metric." *Science and Children* 13:8, September 1975.

Hughes, Rowland, "Teaching Measurement and the Metric System." *Science and Children* 12:7, March 1975.

Iona, Mario, "Making Comparisons of Rulings for Metric Measuring Devices." *Science and Children* 12:20, March 1975.

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Lemmon, Robert A. "Quantitative Descriptions in Science." *Science and Children* 3:12, December 1965.

Leonard, Edward H., "A Modified Meter Stick." *Science and Children* 3:7, March 1966.

Schultz, Klaus, "Do-It-Yourself Metrication." *Science and Children* 12:18, March 1975.

Sheffield, Susan G., "The Meter Stick." *Science and Children* 10:22, March 1973.

Slesnick, Irwin and John Whitmer, "Think Metric." *Science and Children* 13:36, April 1976.

Stronck, David R. and Linda Turner. "Making Measurements and Metric Units." *Science and Children* 12:21, March 1975.

Subarsky, Zachariah, "Curriculum Construction for K-6 Science and Math--A Strategy." *Science and Children* 6:15, November 1968.

Swan, Malcolm D., "Experience, Key to Metric Unit Conversion." The Science Teacher 37:69, November 1970.

Todd, Robert M., et al., "Metric Concepts for Children With Specific Learning Disabilities." Science and Children 13:19, May 1976.

Walker, Margaret, "Metric in the Kindergarten." Science and Children 12:26, March 1975.

Yeany, Russell H., Jr., "Teaching Third and Fourth Graders the Metric System"; "Going Metric"; and "Introduction: The Metric System." Science and Children 13:31, April 1976.

Zimmerman, Marianna, "Let's Make Metric Ice Cream." Science and Children 12:11, March 1975.

Elementary School Science Curriculum Projects
Funded by NSF and Currently Marketed

PROGRAM	HEADQUARTERS OFFICE	SUPPLIER
CONCEPTUALLY ORIENTED PROGRAM IN ELEMENTARY SCIENCE (COPES)	New York University 4 Washington Place, Room 706 New York, New York 10003	(Headquarters Office)
ELEMENTARY SCIENCE STUDY (ESS)	Education Development Center 55 Chapel Street Newton, Massachusetts 02160	McGraw-Hill Book Company 1221 Avenue of the Americas New York, New York 10020
MINNESOTA SCHOOL MATHEMATICS AND SCIENCE TEACHING PROJECT (MINNEMAST)	Minnesota School Mathematics and Science Center University of Minnesota 720 Washington Avenue, S.E. Minneapolis, Minnesota 55414	(Headquarters Office)
SCIENCE--A PROCESS APPROACH (SAPA)	American Association for the Advancement of Science 1776 Massachusetts Avenue, N.W. Washington, D.C. 20036	Ginn-Xerox 191 Spring Street Lexington, Massachusetts 02173
SCIENCE CURRICULUM IMPROVEMENT STUDY (SCIS)	Lawrence Hall of Science University of California Berkely, California 94720	Rand-McNally Company P.O. Box 7600 Chicago, Illinois 60680
UNIVERSITY OF ILLINOIS ASTRONOMY PROGRAM (UIAP)	Department of Astronomy University of Illinois Urbana, Illinois 61801	Harper and Row Publishers 10 East 53rd Street New York, New York 10022
UNIFIED SCIENCE AND MATHEMATICS FOR ELEMENTARY SCHOOLS (USMES)	USMES Education Development Center 55 Chapel Street Newton, Massachusetts 02160	(Headquarters Office)

ELEMENTARY SCIENCE TEXTBOOK SERIES

Challenge Activities Program in Science. (1-6) Stone and Kavanagh. 1976. Houghton Mifflin Company, 1 Beacon Street, Boston, MA 02109

Concepts in Science. (1-6) Brandwein. 1975. Harcourt Brace Jovanovich, Inc., 757 Third Avenue, New York, NY 10017

Discovering Science. (K-6) Piltz, Van Bever, Roche, Blough and Costa. 1973. Charles E. Merrill Publishing Company. 1300 Alum Creek Drive, Columbus, OH 43216

Elementary School Science Series. (K-6) Rockcastle, et al. 1975. Addison-Wesley Publishing Company, Inc., Reading, MA 01867

Elementary Science Learning by Investigation. (1-6) Brewer. 1974. Rand McNally & Company, Box 10128, Palo Alto, CA 94303

Exploring Science. (1-6) Blecha, Gega and Green. 1976. Laidlaw Brothers, Thatcher & Madison Streets, River Forest, IL 60305

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Modern Elementary Science. (1-6) Fischler, et al. 1971. Holt, Rinehart and Winston, 383 Madison Avenue, New York, NY 10017

Modular Activities Program in Science. (1-6) Berger, et al. 1974. Houghton Mifflin Company, 1 Beacon Street, Boston, MA 02107

People, Concepts and Processes. (K-6) Holmes. 1974. McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020

Science--Understanding Your Environment. (K-6) Mallinson and Mallinson, et al. 1972. Silver Burdett Company, 250 James Street, Morristown, NJ 07960

Self-Paced Investigations for Elementary Science. (5-6) Katagiri, Trojcak, and Brown. 1976. Silver Burdett Company, 250 James Street, Morristown, NJ 07960

Young Scientist, The. (1-6) Navarra and Zaffaroni. 1971. Harper & Row, Publishers, 10 East 53 Street, New York, NY 10022

Ventures in Science. (1-6) Spennate and Pless. 1974. William H. Sadlier, Inc., 11 Park Place, New York, NY 10007

SCIENCE TEXTBOOKS FOR TEACHER TRAINING

Creative Teaching of Science in the Elementary School. Piltz and Sund. 1974. Allyn and Bacon, Inc., 470 Atlantic Avenue, Boston, Massachusetts 02210

Discovering Science in the Elementary School. Selberg, Neal, and Vessel. 1970. Addison-Wesley Publishing Company, Inc., Reading, MA 01867

Elementary School Science. Blough and Schwartz. 1974. Holt, Rinehart and Winston, 383 Madison Avenue, New York, NY 10017

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Everyday Living Approach to Teaching Elementary Science, The. Scott. 1970. Prentice-Hall, Inc., Englewood Cliffs, NJ 07632

New Elementary School Science, The. Jacobson. 1970. Van Nostrand Reinhold Company, 450 West 33 Street, New York, NY 10001

Science for Children. Hubler. 1974. Random House, Inc., 201 East 50 Street, New York, NY 10022

Science for the Elementary School. Victor. 1970. Macmillan, Inc., 866 Third Avenue, New York, NY 10022

Science in Elementary Education. Gega. 1970. John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10016

Teaching Elementary Science Education Through Instruction in Colloquim Blackwood and Lansdown. 1971. Harcourt Brace Jovanovich, Inc., 757 Third Avenue, New York, NY 10017

Teaching Modern Science. Carin and Sund. 1975. Charles E. Merrill Publishing Company. 1300 Alum Creek Drive, Columbus, OH 43216

Teaching of Science, The. Butts. 1974. Harper & Row, Publishers, 1000 Prince Street, Greenlawn, NY 11740

Teaching of Science in the Elementary School, The. Lewis and Potter. 1970. Prentice-Hall, Inc. Englewood Cliffs, NJ 07632

Teaching Science as Continuous Inquiry. Rowe. 1973. McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, NY 10020

Teaching Science in the Elementary School. Butts. 1973. The Free Press, 866 Third Avenue, New York, NY 10022

Teaching Science in the Elementary School. Renner, Stafford and Ragan. 1973. Harper & Row, Publishers, 10 East Street, New York, NY 10022

Teaching Science Through Discovery. Carin and Sund. 1975. Charles E. Merrill Publishing Company. 1300 Alum Creek Drive, Columbus, OH 43216

ED 115 488 SE 019 831

Bitter, Gary G. Geer, Charles

Materials for Metric Instruction. Mathematics Education Reports.

ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.

Spons Agency—National Inst. of Education (DHEW), Washington, D.C.

Pub Date Aug 75

Note—85p.

Available from—Ohio State University, Center for Science and Mathematics Education, 244 Arps Hall, Columbus, Ohio 43210 ($2.00)

EDRS Price MF-$0.76 HC-$4.43 Plus Postage

Descriptors—*Audiovisual Aids, Bibliographic Citations, *Bibliographies, Elementary School Mathematics, Elementary Secondary Education, Films, Filmstrips, Instructional Materials, *Mathematics Education, Mathematics Materials, Measurement, *Metric System, *Resource Materials, Secondary School Mathematics, Slides

This compilation lists available metric kits (41 listings), task cards (8 listings), films (24 listings), filmstrips (36 listings), slides (4 listings), and other miscellaneous metric materials (13 listings). The bibliography is intended as a quick reference or source of information for supplementary metric materials. For each entry the source, cost, level of learning, and a brief description are included. No product judgments are made, and inclusion on the list does not imply endorsement of the product. (JBW)

ED 115 494 SE 019 881

Leffin, Walter W.

Going Metric: Guidelines for the Mathematics Teacher, Grades K-8.

National Council of Teachers of Mathematics, Inc., Reston, Va.

Pub Date 75

Note—51p.

Available from—National Council of Teachers of Mathematics, Inc., 1906 Association Drive, Reston, Virginia 22091 ($1.50, discounts on quantity orders)

EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.

Descriptors—Classroom Materials, Elementary School Mathematics, Elementary Secondary Education, *Guidelines, Learning Activities, *Mathematics Education, Measurement, *Metric System, *Resource Materials, Secondary School Mathematics, *Teaching Guides

This booklet gives a brief history of the metric system up to the present time. A detailed explanation of the international system of units (SI units) for length, area, volume, mass, temperature, and time is included. Also included are five check-up tests with answers for the measures of length, area, volume, and weight, as well as tables of all metric prefixes and of practical units for commerce and trade. A third section contains general guidelines for teaching the metric system with specific directions for spelling, punctuation, and use of metric symbols. The fourth section contains classroom activities, lists of recommended materials, and instructions for student-made learning aids. (JBW)

ED 115 953 95 CE 005 848

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Ohio State Univ., Columbus. Center for Vocational and Technical Education.

Spons Agency—Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.

Report No—VT-102-344

Pub Date 74

Grant—OEC-0-74-9335

Note—154p.; For related document, see CE 004 827

EDRS Price MF-$0.76 HC-$8.24 Plus Postage

Descriptors—Adult Education, *Annotated Bibliographies, Audiovisual Aids, Indexes (Locaters), Information Sources, *Metric System, *Reference Materials, *Resource Guides, Technical Education, *Vocational Education

The annotated bibliography is designed to help vocational, technical, and adult education teachers and others locate available materials on metric education. Each cited item is available from a supplier or an information system. It is organized into three sections: instructional materials, reference materials, and resource lists. The instructional materials section is organized by material type: instructor guides, student materials, and audiovisual materials. Each citation provides information on possible use; for example, educational level indicated in parenthesis at the end of each citation and content indicated in the annotation. Included in the reference materials section are items on general metrication, impact on education, metrication of business and industry, impact on consumers, international systems of units (SI), converting from customary to metric units, national and international standards, and bibliographies. The lists of resources in section 3 are designed to help the user locate organizations, publishers, suppliers, and resource persons who may be helpful in developing or selecting curriculum materials. Names, addresses, and available materials and services are given. (Author/NJ)

ED 116 925 95 SE 019 964

Metrics in Education - Resource Materials.

New York State Education Dept., Albany. Div. of Curriculum Development.; Western Michigan Univ., Kalamazoo. Center for Metric Education.

Spons Agency—Bureau of Adult, Vocational, and Technical Education (DHEW/OE), Washington, D.C.

Bureau No—V257006

Pub Date [75]

Grant—OEG-0-72-1868

Note—59p.

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—*Charts, Instructional Materials, Mathematics Materials, Measurement, *Metric System, *Post Secondary Education, *Resource Materials, Secondary Education, *Secondary School Mathematics, Technical Mathematics

This publication contains materials suitable for reproduction as transparencies or as classroom handouts. These metric materials may be used in a variety of occupational and practical arts courses. The format of the materials is in large print, some with humorous drawing; details of drawings and charts are easy to read. Introductory pages deal with all units of metric measures but the primary emphasis is upon linear uses of metric measures. Specific topics include: reading a metric micrometer and a vernier caliper, tables of metric hardware sizes, diagrams of metric hardware (nuts, bolts, screws, wrenches, etc.), master dimensioning, dual dimensioning, conversion tables, metric-sizes of softwood, orthographic projection comparisons (first and third angle), paper sizes and weights, and printer's units. (JBW)

ED 117 429 95 CE 006 076

Atkinson, Marilyn And Others

Career Education: Learning with a Purpose. Secondary Guide-Vol. 2. Business, Metrics, Special Education, Field Trip Sites and Guest Speakers.

State Fair Community Coll., Sedalia, Mo.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Note—158p.; For Volumes 1-6 see CE 006 075-080; For Junior High School Guides, see CE 006 362-365

EDRS Price MF-$0.83 HC-$8.69 Plus Postage

Descriptors—*Business Education, *Career Education, Curriculum Development, Curriculum Guides, Educational Objectives, Guidelines, Integrated Curriculum, Learning Activities, *Metric System, Resource Materials, *Secondary Education, *Special Education, Teacher Developed Materials, Teaching Procedures, Units of Study (Subject Fields)

The guide offers a compilation of teacher-developed career education materials which may be integrated with secondary level curriculum and, in some cases, complete units or course outlines are included. Suggested activities and ideas are presented for three subject areas: business, metrics, and special education. The business education section provides activity suggestions related to steps in applying for employment and a discussion of employee and customer relations, and includes role playing situations as well as teaching procedures and resource lists. The metrics section provides activity suggestions integrating metrics into art, economics, English, math, home economics, science, and social studies; student worksheets; charts; and a metrication resource list. The special education section offers a course of study for a vocational multi-occupation class including a discussion of objectives, scope, and content; a list of discussion topics and related and integrated learning activities; textbooks and references; and instructional aids. A 13-page list of suggested local field trip sites and guest speakers is included. (EC)

ED 118 424 SE 020 270

Richmond, Doug

Metrics for Mechanics and Other Practical People.

Pub Date 75

Note—172p.

Available from—Dos Reals Publishing, 2490 Channing Way, Berkeley, California 94704 ($4.00, paperbound)

Document Not Available from EDRS

Descriptors—Auto Mechanics (Occupation), Craftsmen, Guides, Industrial Arts, Industrial Education, *Manuals, Measurement, *Metric System, *Post Secondary Education, *Practical Mathematics, *Vocational Education

This handbook on the metric system is printed in a large type for ease of reading. It includes several tables of often-used facts. A brief background of the metric system is presented, followed by chapters on metric uses with electricity, length, pressure, temperature, threaded fastenings, tools, torque, volume, and weight. Each chapter provides a brief background of the metric concept followed by straightforward explanations of how to convert between metric and U.S. measures (using multiplication only). The handbook is directed toward mechanics and other craftsmen who seek a quick solution without any mathematical explanation. (JBW)

ED 113 064 95 CE 004 827

Cooper, Gloria S. And Others

Metric Education; A Position Paper for Vocational, Technical and Adult Education.

Ohio State Univ., Columbus. Center for Vocational and Technical Education.

Spons Agency—Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.

Pub Date 75

Contract—OEC-0-74-9335

Note—51p.

Available from—Product Utilization, The Center for Vocational Education, Ohio State University, 1960 Kenny Road, Columbus, Ohio 43210 ($3.00)

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—*Adult Basic Education, Adult Education, Bibliographic Citations, Curriculum Development, *Futures (of Society), *Metric System, Teaching Methods, *Technical Education, *Vocational Education

Part of an Office of Education three-year project on metric education, the position paper is intended to alert and prepare teachers, curriculum developers, and administrators in vocational, technical, and adult education to the change over to the metric system. The five chapters cover issues in metric education, what the metric system is all about, the impact metrication will have on vocational and technical education, the implications of metric instruction for adult basic education, and curriculum and instructional strategies. Each of the chapters is organized into four parts. The first part is a one-page overview which highlights the main points of the chapter. The second consists of some questions and answers which reflect the fears and concerns of teachers, administrators, and students. The third part contains in-depth coverage of the subject, and the fourth is a brief list of references for those who may wish to read further. (Author/EA)

ED 113 166 SE 019 670

Measurement with Metric. A Resource Handbook. Field Test Version.

Oregon State Dept. of Education, Salem.

Pub Date 75

Note—48p.; occasional marginal legibility

Available from—Documents Clerk, Oregon Department of Education, 942 Lancaster Drive, N.E., Salem, Oregon 97310

EDRS Price MF-$0.76 HC-$1.95 Plus Postage

Descriptors—Activity Learning, Higher Education, Instructional Materials, Laboratory Procedures, *Mathematics Education, *Measurement, *Metric System, State Departments of Education, *Teacher Education, Teaching Guides, *Teaching Methods

This handbook, prepared in field-test version, is intended to provide in-service teachers with "guidance in the development of the basic concepts of measurement." The basic assumption on which this guidance is based is that "hands-on" experience is the most appropriate method of teaching metric measurement. An additional premise is that students should learn to think in the metric system, and not to convert from the English to the metric system. The handbook is divided into five sections. After the rationale for teaching the metric system is presented in part one, a variety of activities for teachers' use in developing pre-measurement and measurement skills is described in part two. Section three is designed to aid in the planning and conducting of metric workshops, and section four, on implementation, describes materials needed. A glossary of terms and a bibliography comprise section five. (SD)

ED 113 168 √ SE 019 672

Wallace, Jesse D.

Going Metric...PAL (Programmed Assigned Learning).

Pub Date 74

Note—41p.

Available from—Dr. Jesse D. Wallace, 1078 East 5th Avenue, Chico, Calif. 95926 (1-4 copies, $2.25 ea., 5 or more copies, $1.75 ea.)

Document Not Available from EDRS

Descriptors—Adult Education, Mathematical Applications, *Measurement, *Metric System, *Programed Instruction, Secondary Education, *Secondary School Mathematics, Vocabulary, *Workbooks

This 41-page programed booklet is intended for use by students and adults. It introduces the metric units for length, area, volume, and temperature through a series of questions and answers. The advantages of the metric system over the English system are discussed. Conversion factors are introduced and several applications of the metric system in everyday situations, scientific problems, and manufacturing areas are explored. (SD)

ED 113 188 SE 019 737

Trent, John H.

Need for In-Service and Pre-Service Metric Education.

Pub Date 75

Note—16p.

EDRS Price MF-$0.76 HC-$1.58 Plus Postage

Descriptors—*Educational Needs, Elementary Secondary Education, Inservice Education, *Mathematics Education, Mathematics Teachers, Measurement, *Metric System, *Research, Surveys, *Teacher Education

Identifiers—Nevada, Research Reports

Two questionnaires were given to a random sample of rural and urban elementary and secondary teachers as well as to mathematics methods students at the University of Nevada. The questionnaires were used to determine (1) the need for inservice and preservice metric education and (2) the present knowledge of the metric system of Nevada teachers. The data indicated: (1) a need for inservice metric workshops for both rural and metropolitan elementary levels, (2) the need is not as great for workshops at junior and senior high levels, (3) elementary mathematics methods students are not adequately prepared in the metric system, and (4) secondary mathematics methods students and junior and senior high teachers are more adequately prepared in the metric system than their elementary counterparts. This paper suggests a workshop for secondary teachers and recommends that a more relevant and comprehensive questionnaire be prepared to verify the need for a workshop. (JBW)

ED 113 189 SE 019 738

Trent, John H.

Metric Education in Mathematics Methods Classes.

Pub Date 75

Note—4p.

EDRS Price MF-$0.76 HC-$1.58 Plus Postage

Descriptors—Educational Needs, *Elementary School Mathematics, *Higher Education, Mathematics Education, Measurement, *Methods Courses, *Metric System, Preservice Education, Research, *Teacher Education

Identifiers—Research Reports

A pre-test on knowledge of the metric system was administered to elementary mathematics methods classes at the University of Nevada at the beginning of the 1975 Spring Semester. A one-hour lesson was prepared and taught regarding metric length, weight, volume, and temperature. At the end of the semester the original test was given as the post-test. This paper gives the results of both tests and concludes that, even though not significant, improved knowledge was noted in the areas surveyed. It is stated that more than one hour may be needed to teach metrication to future elementary teachers, but one hour is valuable. (JBW)

ED 115 480 SE 019 739

Trent, John H.

Comparative Needs of Elementary and Secondary In-Service Teachers and College Pre-Service Students for Metric Education.

Pub Date 75

Note—25p.

EDRS Price MF-$0.76 HC-$1.58 Plus Postage

Descriptors—*Educational Needs, Elementary Secondary Education, Higher Education, Inservice Education, *Mathematics Education, Measurement, *Metric System, Preservice Education, *Research, Surveys, *Teacher Education

Identifiers—Research Reports

This paper reports on a survey of the need for inservice metric education and for greater emphasis upon metric education in mathematics methods courses in Nevada. The report is based upon data from two types of questionnaires. One questionnaire surveyed the need for metric workshops. The second questionnaire surveyed the present knowledge of the metric system. Both questionnaires were administered to a random sample of elementary, junior high, and high school teachers in Nevada and to elementary and secondary mathematics method students at the University of Nevada, Reno. The paper contains eight tables comparing the data from these two questionnaires. Each table is followed by separate conclusions. In general, it is concluded that there is a need for metric workshops for elementary teachers of Nevada and that more amphasis should be incorporated into elementary mathematics methods courses. Furthermore, it is recommended that a relevant comprehensive questionnaire be prepared and administered to secondary mathematics and science teachers in order to verify the need for further metric education. (BW)

ED 115 482 SE 019 747

Prigge, Glenn, Ed.

Metric Measurement.

North Dakota Univ., Grand Forks. Dept. of Mathematics.

Pub Date 75

Note—101p.

EDRS Price MF-$0.76 HC-$5.70 Plus Postage

Descriptors—*Elementary School Mathematics, Instruction, Mathematics Materials, *Measurement, *Metric System, *Resource Materials, *Secondary School Mathematics, Teacher Developed Materials

This resource book of metric lessons was prepared by the Metric Systems Class at the University of North Dakota. Length, area, volume and capacity, mass and weight and temperature are developed through techniques such as puzzles, manipulative devices, and experiments. Activities are described in terms of materials needed, directions, and follow-up questions and/or activities. There is a wide variety of useful metric activities for each measurement concept. (JBW)

ED 107 487 **SE 018 847**

Kennedy, Keith

The Effectiveness of a Comparative Advance Organizer in the Learning and Retention of Metric System Concepts.

Pub Date Mar 75

Note—9p.; Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (48th, Los Angeles, California, March 1975)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Achievement, Cognitive Measurement, *College Science, Educational Research, *Elementary School Teachers, Higher Education, *Instruction, *Learning Processes, Metric System, Science Education, Teacher Education

Identifiers—*Advanced Organizers, Research Reports

Using student ability, measured by grade point average and cognitive structure, as measured by the number of high school and college courses in science and mathematics, as predictor variables, the investigator attempted to determine the reliability of the use of advance organizers to enhance the retention of meaningful concepts. Students enrolled in a required course, Physical Science for Elementary Teachers, were the participants and were randomly assigned to one of three treatment groups. Group 1 received an investigator-developed comparative advance organizer prior to instruction in the metric system; group 2, an investigator-written historical account of its development; and group 3 received no prior instruction and was used for control purposes only. All participants within each group were subdivided according to ability and cognitive structure. The McFee Metric Test, the instrument used as a pretest, the study of experimental introductory passages, participation in learning activities, posttesting, and delayed posttesting were incorporated into the study. A 2 x 3 analysis of variance was used and when significant F ratios were obtained, the Scheffe Test was used in a post hoc partitioning of the sum-of-squares. Results suggested that the comparative advance organizers have potential that needs to be more fully utilized. (Author/EB)

ED 107 533 **SE 019 341**

Adams, Constance Coburn

Adoption of the Metric System by Consumers: A Program for New York State Cooperative Extension.

Pub Date Jun 75

Note—108p.; Master's Thesis, Cornell University

EDRS Price MF-$0.76 HC-$5.70 PLUS POSTAGE

Descriptors—Comparative Education, *Consumer Education, Educational Planning, Home Economics Education, Inservice Education, *Instruction, Masters Theses, *Mathematics Education, Measurement, *Metric System, *Post Secondary Education, Research, Surveys

Identifiers—Research Reports

The purpose of this study was the identification of effective means of educating the general public to think in terms of the metric system. Toward this end, extension home economists in New York State were surveyed concerning their plans to implement teaching of the metric system. A literature review was conducted over four basic topics: (1) experiences of other nations adopting the metric system, (2) recent changes of a similar nature (e.g., Britain's adoption of decimal currency), (3) the role of change agents, and (4) characteristics of adult learners. The major findings involved the importance of using mass media in educating the public. Several suggestions to Cooperative Extension Services are provided. (SD)

ED 108 928 **SE 019 146**

Pigford, Valma Darleen

A Comparison of an Individual Laboratory Method with a Group Teacher Demonstration Method in Teaching Measurement and Estimation in Metric Units to Preservice Elementary Teachers.

Pub Date 74

Note—144p.; Ph.D. Dissertation, The Florida State University

Available from—University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106 (Order No. 75-941, MF-$5.00, Xerography-$11.00)

Document Not Available from EDRS

Descriptors—Doctoral Theses, Elementary School Mathematics, Higher Education, Instruction, *Laboratories, *Mathematics Education, Measurement, *Metric System, *Research, *Teacher Education

Identifiers—*Estimation, Research Reports

Two methods of instructing preservice elementary teachers in the metric system are compared in this study. In the laboratory method 28 subjects handled equipment and participated in measurement and estimation activities. The 29 subjects in the lecture demonstration group met as a class and individually recorded results of the same activities performed by the lecturer. All students covered four units dealing with length, weight, capacity, and temperature. Tasks within units were directed to four objectives: selecting appropriate units, reading instruments, converting between units, and estimating quantitative properties of familiar objects. Student progress was measured by pretest, posttest, and retention test, each consisting of 31 multiple-choice and 5 short-response items. All materials were experimenter developed. Covariate analyses and t-tests were used in data analysis; an alpha level of .05 was specified. No differences between groups were discovered on either the posttest or the retention test. Within groups all differences among pretest, posttest and retention test scores were shown to be significant. On the basis of these results the author recommends that the lecture demonstration method be used in situations where cost-effectiveness is a consideration. (SD)

ED 110 348 **SE 019 460**

Gibb, E. Glenadine

Moving to Metrics in Our Schools.

Pub Date Feb 75

Note—9p.; Paper presented at the Annual Convention of American Association of School Administrators (107th, Dallas, Texas, February 21-22, 1975)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Educational Change, Elementary Secondary Education, Federal Legislation, *Inservice Education, Instructional Materials, *Mathematics Education, *Measurement, *Metric System, Parent Education, Teacher Education

This speech, addressed to school administrators, outlines the reasons for implementing instruction in the metric system and offers advice on several aspects of this implementation. The author observes that although the primary responsibility for teaching metric measurement will fall on the mathematics teacher, other teachers (e.g., science, vocational education) will need to use the metric system in their classes, and, therefore, recommends in-service programs for all teachers. These programs should aim at development of the ability to use measuring instruments and to estimate quantities in metric terms, rather than at conversion of units. Parent education nights are also advocated. A list of basic equipment needed for metric instruction and another of journals and other resources concerned with the metric system are provided. (SD)

ED 111 669 **SE 019 647**

Perica, Lou, Ed.

A Report to the Nation on the Management of Metric Implementation.

American National Metric Council, Washington, D.C.

Pub Date Jan 75

Note—31p.

Available from—American National Metric Council, 1625 Massachusetts Avenue, N. W., Washington, D. C. 20036 (ANMC subscribers, single copy $2; all others, single copy, $3; bulk rates available)

Document Not Available from EDRS

Descriptors—Changing Attitudes, *Educational Change, *Legislation, *Mathematics Education, *Measurement, *Metric System, National Organizations, Reports, Surveys, Teacher Education

Identifiers—American National Metric Council, *Management of Metric Implementation

The progress toward United States conversion to the metric system is the major focus of this publication. The status of Federal legislation and the influence of anti-trust laws on this legislation are discussed. Metric implementation by industry is surveyed with respect to several industries: automobile, aerospace, tooling, building and construction, metal products, and consumer products. Federal and state activity supporting education and training in the metric system is discussed. Results of a survey of institutions preparing teachers of home economics, industrial arts, and vocational education are presented, together with recommendations based on the survey results. Metric implementation in five other countries is briefly reviewed. A list of other publications available from the American National Metric Council is included. (SD)

ED 111 683 **SE 019 692**

Henschel, Mark

Metric Supplement to Technical Drawing.

Pub Date Jun 75

Note—48p.

Available from—Mark Henschel, 3123 N. Seminary, Chicago, Ill. 60657 ($1.50, special discount to schools and non-profit institutions)

Document Not Available from EDRS

Descriptors—Adult Education, Diagrams, *Drafting, Engineering Drawing, Manuals, Mathematics Education, *Measurement, *Metric System, *Post Secondary Education, Technical Illustration, Textbooks, *Vocational Education, Vocational Retraining

This manual is intended for use in training persons whose vocations involve technical drawing to use the metric system of measurement. It could be used in a short course designed for that purpose or for individual study. The manual begins with a brief discussion of the rationale for conversion to the metric system. It then provides a straightforward discussion of the metric units for length, area, volume, mass, and temperature. The remainder of the text is devoted to drafting in the metric system. Topics include conversion from inch drawings to metric drawings, tolerance conversions, and dual dimensioning. Sample specifications and drawings are provided for many objects (screw threads, sprockets, adaptors, steel casing, etc.). Many questions appear throughout the manual; answers are provided in an appendix. (SD)

ED 103 231 **SE 018 459**

Bidwell, James K., Ed.

Metric Measurement Activity Cards. Monograph No. 4.

Michigan Council of Teachers of Mathematics.

Pub Date Apr 74

Note—79p.; Guidelines for Quality Mathematics Teaching

Available from—Horace L. Mourer, M.C.T.M. Publications Chairman, 2165 E. Maple Road. Birmingham, Michigan 48008 ($2.00, prepaid)

Document Not Available from EDRS.

Descriptors—*Activity Learning, Curriculum, Elementary Education, *Elementary School Mathematics, Instruction, *Instructional Materials, Mathematics Education, *Measurement, *Metric System, Teaching Guides

This document introduces the metric measurement system to students in the elementary grades through ready-to-use activity cards covering metric concepts of length, area, and volume. The cards provide a minimal sequence of activities aimed at helping the student become familar with each measurement concept; cards are ungraded and can be used as soon as children can read or have the card read to them. A list of needed materials, spiritmaster originals for worksheets, and brief directions for the teacher are included. Eighteen sources for commercial equipment and fifteen suggested sources for further reading are listed. (DT)

ED 103 282 **SE 018 947**

Tardif, Robert And Others

Interstate Consortium on Metric Education. Final Report.

California State Dept. of Education, Sacramento.

Pub Date 75

Note—28p.

EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE

Descriptors—*Conference Reports, Elementary Secondary Education, Evaluation, Guidelines, Inservice Teacher Education, *Instructional Materials, Interstate Programs, *Mathematics Education, Measurement, *Metric System, Program Coordination, *Teacher Education

[illegible] consortium of representatives of 28 states [illegible] territories prepared a set of general guidelines and principles for implementation of the metric system. Twenty-three recommendations were made in three broad areas: development and evaluation of instructional material and pedagogy (11), implementation of changeover and promotion of public support (7), and pre-service and in-service teacher education (5). In addition to these recommendations, this report provides lists of topics and activities related to the metric system appropriate to classes at different grade levels and curricular areas. A discussion of the mass-weight controversy, and a copy of the 1974 congressional amendments concerning the use of the metric system of measurement are also included. (SD)

ED 104 718 **SE 019 005**

Beam, Karen G., Comp.

The Metric System: A Bibliography of Instructional Materials. Second Revised Edition.

Indiana State Dept. of Public Instruction, Indianapolis.; Wayne Township Metropolitan School District, Indianapolis, Ind.

Pub Date Jan 75

Note—36p.

EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE

Descriptors—Annotated Bibliographies, *Bibliographies, Curriculum, Elementary Secondary Education, Films, Games, Instruction, *Instructional Materials, Learning Activities, *Mathematics Education, Measurement, *Metric System, Visual Aids, Worksheets

This volume provides listings and brief descriptions of instructional materials for use in teaching the metric system. Printed materials of three [illegible] (duplicating masters, periodicals, and U.S. Government documents) are included. Other materials described include charts, films, filmstrips and slides, games, posters, recordings, and transparencies. For most items the listing provides suggested grade levels, a brief description, source, catalog and/or other information for use in ordering, and price. Names and addresses of publishers and producers are provided. (SD)

ED 104 719 **SE 019 006**

Szabo, Michael And Others

Metric Education Activities in State and Territorial Departments of Education - A Survey.

ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.; Ohio State Univ., Columbus. Center for Science and Mathematics Education.

Spons Agency—National Inst. of Education (DHEW), Washington, D.C.; Pennsylvania State Univ., University Park. Coll. of Education.

Pub Date Feb 75

Note—48p.

Available from—Ohio State University, Center for Science and Mathematics Education, 244 Arps Hall, Columbus, Ohio 43210 ($1.00)

EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE

Descriptors—Budgets, Curriculum Development, Educational Change, Educational Legislation, *Educational Planning, Inservice Teacher Education, *Mathematics Education, *Metric System, National Surveys, Research, *State Departments of Education, *Surveys

By reviewing the literature on metric education, the authors identified eight major categories of concern: (1) national planning, (2) state planning, (3) budget needs, (4) curriculum development, (5) inservice training, (6) exemplary programs, (7) legislation, and (8) anticipated needs. A 16-item questionnaire to assess status with respect to these areas was developed and sent to state supervisors of science and mathematics. Responses were received from 46 states, the District of Columbia, and 4 territories. Data were analyzed and used to estimate the extent to which states were able to meet four objectives: comprehensive planning, effort for legislation, provision of curricular materials and inservice training, and budgetary support. It was concluded that states exhibited these abilities only slightly. The authors recommend that objectives for full metric education be developed, and that communication channels among states be established to aid in the development of materials. They also advise that metric consultants be identified, that efforts to pass legislation be intensified and that the approach to metric education be an interdisciplinary one. The questionnaire used and data collected are appended to this report. (SD)

ED 104 722 **SE 019 010**

Metric Conversion: An Annotated Bibliography for Teachers.

National Education Association, Washington, D.C.

Report No—IPD-Doc-74-6

Pub Date Dec 74

Note—14p.; NEA Information on Instruction and Professional Development

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Annotated Bibliographies, Audiovisual Aids, *Bibliographies, Curriculum, Educational Change, Elementary Secondary Education, Films, *Instruction, *Instructional Materials, Literature Reviews, *Mathematics Education, Measurement, *Metric System, Teacher Education, Video Tape Recordings

Identifiers—*Metric Conversion, National Education Association, NEA

This annotated bibliography was compiled to provide teachers with sources of information concerning the metric system. Articles of general interest concerning the reasons for change and experiences of others in implementing the change are included, as well as materials for practical use by teachers. Books and articles from current journals are described in some detail; bibliographic information is provided and, where appropriate, price and ordering information is included. Among the articles of general interest several government documents dealing with metric units in industry are listed. Books and articles listed for practical use range from detailed expositions of the system itself to guidelines on the teaching of the metric system at various grade levels. Seven films, twenty-one filmstrips, and two videotape films series, appropriate for classroom use, are described; prices and ordering information are provided. (SD)

ED 104 725 **SE 019 039**

Chalupsky, Albert B. And Others

Going Metric: An Analysis of Experiences in Five Nations and Their Implications for U.S. Educational Planning. Final Report.

American Institutes for Research in the Behavioral Sciences, Palo Alto, Calif.

Spons Agency—National Inst. of Education (DHEW), Washington, D.C.

Report No—AIR-41800-2/74-FR

Pub Date 74

Note—140p.; For a related document, see SE 019 040

EDRS Price MF-$0.76 HC-$6.97 PLUS POSTAGE

Descriptors—Curriculum, Educational Experience, *Educational Planning, *Instruction, International Programs, *Mathematics Education, Measurement, *Metric System, Research, *Surveys, Teacher Education

This study was undertaken in order to gather information concerning conversion to the metric system by other countries which might be useful in planning for conversion by the United States. Representatives of organizations in five countries (United Kingdom, Australia, South Africa, New Zealand, and Canada) which had recently converted to the metric system were surveyed. The survey instrument was designed to cover 15 key areas related to influences for and resistance to conversion, scheduling, teaching strategies, development of materials and programs, and suggestions for the United States. Concurrently with the survey the investigators developed an overseas data collection network and a complex information storage system, and conducted an intensive literature review. Findings are related to: (1), the identification of groups exerting influence for metrication; (2) strategies, materials and special problems of metric instruction; (3) teacher training; and (4) changes respondents would make in their country's approaches. Nine implications and recommendations are posed by the investigators. This report includes discussions of the programs in each of the five countries and an extensive bibliography. (SD)

ED 104 726 **SE 019 040**

Chalupsky, Albert B. And Others

Metric Inservice Teacher Training: Learning from the English and Australian Experience. Final Report.

American Institutes for Research in the Behavioral Sciences, Palo Alto, Calif.

Spons Agency—National Inst. of Education (DHEW), Washington, D.C.

Report No—AIR-48000-3/75-FR

Pub Date 75

Contract—NIE-C-74-0117

Note—87p.; For a related document, see SE 01 039

EDRS Price MF-$0.76 HC-$4.43 PL POSTAGE

Descriptors—*Educational Experience, Educ tional Planning, Elementary Secondary Educ tion, *Inservice Teacher Education, *Math ematics Education, Measurement, *Metr System, Research, *Surveys, Teacher Educ tion

This study was conducted in order to ga detailed information about teacher education pro grams related to the English and Australian con versions to the metric system of measurement. In formation was gathered by review and analysis o relevant official and unofficial documents, and b intensive interviews of key persons involved i teacher education activities related to metrica tion. For each country this report presents discus sions of the background for metrication, distinc tive features of the educational system (e.g Teachers' Centres in England), Characteristics o teacher training programs and materials, an problems identified. Thirteen implications fo United States teacher training related to the met ric system are identified. These concern the rol and optimal sequencing of teacher training activi ties within the overall conversion, the need fo and use of quality materials, the need to dea with anxiety and resistance to change, an evaluation. (SD)

ED 096 126 **SE 018 027**

Metric System.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

port No—NSF-GW-6703

b Date 30 Jun 73

Note—8p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, *General Science, *Measurement, Metric System, *Middle Schools, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional unit deals with the identification of units of measure in the metric system and the construction of relevant conversion tables. Students in middle school or in grade ten, taking a General Science course, can handle this learning activity. It is recommended that high, middle or low level achievers can use the program. Eighteen minutes is the suggested time needed. Three behavioral objectives are given and the equipment and materials needed to help the students achieve the objectives are listed. A student guide and a vocabulary list are also included in the packet. (EB)

ED 096 128 **SE 018 029**

Sisk, Diane

Mass - Metric Weight.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—15p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Behavioral Objectives, *General Science, Instruction, *Instructional Materials, *Measurement, Metric System, *Middle Schools, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional program, developed for high, medium and low level achievers, is directed toward a course in general science in middle schools. Mathematics of fractions and decimals is described as a prerequisite to the use of the packet. Two behavioral objectives are listed. Both involve the students' determining mass, first to the nearest tenth of a gram and a second, to the nearest one-tenth of a gram, using liquids and gases. The equipment needed is listed. A student guide, a vocabulary list and a copy of an evaluation exercise, with instructions and answers, are prepared for the teacher. (EB)

ED 096 129 **SE 018 03)**

Sisk, Diane

Liter - Metric Volume.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—8p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Behavioral Objectives, *General Science, Instruction, *Instructional Materials, *Measurement, Metric System, *Middle Schools, Science Education, Secondary School Science, Teacher Developed Materials, Units O F Study (Subject Fields)

dentifiers—*Del Mod System

This autoinstructional program, developed as part of a general science course, is offered for students in the middle schools. Mathematics of fractions and decimals is considered to be prerequisite knowledge. The behavioral objectives are directed toward mastery of determining volumes of solid objects using the water displacement method as well as by using measurements made with a metric ruler. The equipment needed is listed. Time allotment is 12 minutes. A bibliography is included with the student script. (EB)

ED 096 181 **SE 018 481**

Johnson, J. T., Comp. And Others

The Metric System of Weights and Measures. National Council of Teachers of Mathematics, Yearbook 20 [1948].

National Council of Teachers of Mathematics, Inc., Washington, D.C.

Pub Date 48

Note—317p.

Available from—National Council of Teachers of Mathematics, Inc., 1906 Association Drive, Reston, Virginia 22091

EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE

Descriptors—Adoption (Ideas), *Curriculum, Educational Objectives, *Mathematics Education, *Measurement, *Metric System, Public Opinion, Public Support, Reference Books, *Yearbooks

This yearbook is an effort to reevaluate the metric system and to present testimonies from people in various occupations with respect to metric usage (as of 1948). The first of four major sections explains the metric system and its development. Next are 29 articles discussing the usage of the system in the general areas of education, science, engineering, manufacturing and merchandising, medicine and pharmacy, world trade, armed forces, and athletics. In the public interest section, accounts of magazines, reports, newspapers, radio, and clubs advocating the adoption of the system are given. The fourth section centers on methods of making the adoption both in education and in general. (LS)

ED 097 201 **SE 018 168**

Braun, Pam And Others

Measurement Unit: Awareness, English Units, Metric Units. Primary.

South-Western City School District, Grove City, Ohio.

Pub Date [74]

Note—70p.; Marginal legibility on entire document

Available from—ERIC/SMEAC, The Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)

Document Not Available from EDRS.

Descriptors—Activity Learning, *Elementary School Mathematics, Mathematics Education, *Measurement, *Metric System, *Objectives, Reference Materials, Teacher Developed Materials, *Teaching Guides

This is a teacher-developed guide for use with a unit on measurement in the elementary school. Contents are organized under the three main headings of awareness, English units, and metric units. Objectives are stated, accompanied by a description of suggested implementation activities. Also included are the relationship of the activity to a particular area of the curriculum and the type of thinking skill processes involved in the activity. A listing of needed materials and references is given at the end of each section. (LS)

ED 097 228 **SE 018 456**

Izzi, John

Metrication, American Style. Fastback 41.

Phi Delta Kappa Educational Foundation, Bloomington, Ind.

Pub Date 74

Note—50p.

Available from—Phi Delta Kappa, Eighth and Union, Box 789, Bloomington, Indiana 47401 ($0.50; money must accompany all orders for less than $5.00 or add $1.00 for handling)

Document Not Available from EDRS.

Descriptors—Mathematics Education, *Measurement, *Metric System, Science Education, Science History

The purpose of this pamphlet is to provide a starting point of information on the metric system for any concerned or interested reader. The material is organized into five brief chapters: Man and Measurement; Learning the Metric System; Progress Report: Education; Recommended Sources; and Metrication, American Style. Appendixes include an explanation of the international system of units (SI), some SI definitions, prefixes used for SI units to form multiples and submultiples, essential metric vocabulary for everyday use, and conversion factors from customary units to metric. (DT)

ED 099 642 **CE 002 742**

Hinrichs, Roy S., Comp.

Mississippi Industrial Arts—Metric 500—Instructor's Manual. And: Student Material. Industrial Arts Series 10,003.

Mississippi Research Coordinating Unit for Vocational-Technical Education, State College.

Spons Agency—Mississippi State Dept. of Education, Jackson. Div. of Vocational and Technical Education.

Pub Date 74

Note—33p.

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—*Industrial Arts, Junior High Schools, *Metric System, Models, Secondary Education, *Student Projects, *Teaching Guides

Identifiers—Automobile Racers

The manual provides industrial arts instructors with information necessary to introduce and teach the metric system to their students. The instructional unit is based on a project, the building of a model automobile racer propelled by a carbon dioxide cartridge. To add interest and enthusiasm, Statewide racing competition in which students may participate is an integral part of the unit. In the instructor's section of the document, metrication is discussed in terms of its effect on teachers, abbreviations, linear measurements, the scale, and four brief exercises. The theory for the model car's propulsion is also explained in that section, and procedures for ordering supplies and equipment and defraying their cost are discussed. Rules and safety regulations for conducting the competition are outlined. Preparing stock for the racer and a conversion table concludes the section. The student section (eight pages) includes three instruction sheets: the first explains necessary terminology, the second gives instructions and specifications needed to design the models, the third is a project plan sheet containing the procedure for building the racer. (Author/AG)

ED 100 703 **SE 018 620**

New York Educators and the Metric System: A Survey of Selected Secondary and Post-Secondary Teachers' Usage, Needs, and Feelings Regarding Metric Measurement.

New York State Education Dept., Albany. Bureau of Occupational Education Research.

Pub Date Oct 74

Note—21p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—Inservice Teacher Education, *Mathematics Education, Measurement, *Metric System, Post Secondary Education, Secondary Education, Secondary School Teachers, *Surveys, *Vocational Education

To determine the extent of awareness and use of the metric system among occupational education teachers and students, the New York State Bureau of Occupational Education sent questionnaires to relevant personnel in selected schools throughout the state. Responses were received from 344 teachers in 55 secondary schools and 42 post-secondary institutions. Only 19.4 percent of the secondary teachers surveyed indicated that their students regularly use the metric system; they were health education teachers or training and industrial teachers. Approximately 60 percent of the secondary teachers responding reported that they tried to stimulate awareness of the metric system among their students. More than 70 percent expressed the need or desire to participate in workshops concerning the metric system, but most reported that such workshops were unavailable, and that the primary stimuli for metric work in the classroom came from professional organizations. The data collected from post-secondary teachers supported these points of view. On the basis of these findings, it was recommended that the State Education Department develop hands-on inservice workshops concerned with the teaching of the metric system in occupational education courses and conduct such workshops throughout the state. (SD)

ED 089 799 **IR 000 525**
Suydam, Marilyn N. And Others
Metric Education. Preliminary Report.
Agency for Instructional Television, Bloomington, Ind.
Pub Date Apr 74
Note—97p.; For related documents see IR 000 523 and 524
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—Consortia, Curriculum Design, Curriculum Development, Educational Change, Educational Programs, Instructional Design, Instructional Programs, *Instructional Television, *Measurement, *Metric System, *Programing (Broadcast), Program Proposals, Television Curriculum
Identifiers—Agency for Instructional Television, Metrication, *Metric Education

A description is provided of the scope of the metrication process, the curricular changes it will bring, and the role of instructional television in metric education. The cognitive and affective impacts of metrication upon adults and children are analyzed, along with the opportunity which it provides to re-examine the role of measurement in the curriculum. The metric system is described as one system of measurement, and anticipated curriculum changes are cited. Suggestions for teaching metrics are provided; attention is given to teacher as well as student needs. The report concludes with a consideration of the role of instructional television in metrication and measurement education. Factors associated with television which make it a desirable change agent are outlined; the value of a consortium approach is explored. Specific suggestions are provided for using television to implement metrication, including strategies for development, a time schedule, a program utilization plan, guidelines, and a topical outline of programs. (Author/PB)

ED 090 024 **SE 017 594**
Barbrow, Louis E.
What About Metric?
National Bureau of Standards (DOC), Washington, D.C.
[illegible] Date Oct 73
[illegible]—26p.
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (Stock No. 0303-01191, $0.80)
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—*Consumer Economics, Decimal Fractions, Government Publications, *Mathematics Education, *Measurement, *Metric System, Standards, Temperature, Weight

Implications of the change to the metric system in our daily lives are discussed. Advantages of the metric system are presented, especially its decimal base and ease of calculation which are demonstrated by several worked examples. Some further sources of information are listed. A world map indicates the few remaining countries that have not yet adopted the metric system. (LS)

ED 090 025 **SE 017 595**
Some References on Metric Information.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-389
Pub Date Dec 73
Note—12p.
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (Stock No. 0303-01219, $0.25)
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Bibliographies, Government Publications, *Mathematics Education, *Measurement, *Metric System, *Reference Materials, Resource Materials

This resource work lists metric information published by the U.S. Government and the American National Standards Institute. Also organiza-[illegible] marketing metric materials for education [illegible] given. A short table of conversions is included as is a listing of basic metric facts for everyday living. (LS)

ED 090 027 **SE 017 597**
Brief History of Measurement Systems with a Chart of the Modernized Metric System.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-304A
Pub Date Oct 72
Note—4p.
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (Stock No. 0303-01073, $0.25)
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Federal Legislation, Government Publications, *History, International Organizations, Mathematics Education, *Measurement, *Metric System, *Standards, Temperature, Weight

A short discussion of the need for measurement and the development of ancient measurement systems is given. The English system is traced through its transitions. An account of the development of the metric system is presented from the original defining of the standards through to the recent general conferences on its revision and simplification. A chart of "The International System of Units" (the modern metric system) is given which explains the seven base units. (LS)

ED 090 028 **SE 017 598**
Metric Conversion Act of 1973. Hearing Before the Committee on Commerce, United States Senate, 93rd Congress, First Session on S. 100.
Congress of the U.S., Washington, D.C. Senate Committee on Commerce.
Pub Date 2 Nov 73
Note—94p.
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Economic Factors, *Federal Legislation, Government Publications, Mathematics Education, *Measurement, *Metric System, Reference Materials, Standards

The complete text of the Senate bill to make the metric system the predominate system of measurement in the U.S. is given. Next follows testimony of witnesses: Senators, governmental agencies, representatives of labor unions and industries and the director of the National Bureau of Standards. Also included are some letters from other interested sources, including several educators. (LS)

ED 093 723 **SE 018 120**
Higgins, Jon L., Ed.
A Metric Handbook for Teachers.
National Council of Teachers of Mathematics, Inc., Washington, D.C.
Pub Date 74
Note—132p.
Available from—The National Council of Teachers of Mathematics, 1906 Association Drive, Reston, Virginia 22091 ($2.40)
EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
Descriptors—Activity Learning, Curriculum, Elementary School Mathematics, *Instruction, *Instructional Materials, Learning Activities, *Mathematics Education, *Measurement, *Metric System, Secondary School Mathematics, Teaching Techniques

This handbook has been compiled to provide a reference for teachers at all levels who are implementing the metric system in their classroom. It includes practical suggestions and recommendations for teaching the metric system, as well as papers identifying and discussing the fundamental mathematical and psychological issues underlying the teaching of the metric system in the schools. The articles—some reprinted from recent issues of the "Arithmetic Teacher," some written especially for this publication—are organized under five headings: Introducing the Metric System; Teaching the Metric System: Activities; Teaching the Metric System: Guidelines; Looking at the Measurement Process; and Metrication, Measure, and Mathematics. (Editor/DT)

ED 095 021 **SE 018 174**
Suydam, Marilyn N.
Metric Education. Prospectus.
Agency for Instructional Television, Bloomington, Ind.
Pub Date Sep 74
Note—122p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Curriculum, Guidelines, History, Instruction, *Instructional Television, *Mathematics Education, Measurement, *Metric System, *Program Proposals, Resource Guides
Identifiers—*Agency for Instructional Television, AIT

This prospectus proposes the development, by a consortium of states and provinces working with the Agency for Instructional Television, of television programs to teach measurement with the metric system. The scope and meaning of the metrication process are described, with affective as well as cognitive factors noted. Following a review of how the metric system developed, the meaning of measurement is discussed, and the metric system is presented as one system of measurement. Changes in the curriculum that can be anticipated as the nation goes metric are cited. Guidelines and specific suggestions for teaching the metric system are given, with the focus of instruction on providing measurement experiences. The role of instructional television in meeting the challenge of metrication is considered. An outline, including learner expectancies or goals, is given for 30 programs for the elementary-school level, 4 programs for the secondary-school/adult level, and 2 programs for teacher education. Project schedules and costs for the consortium are given. (MNS)

ED 078 165 **VT 020 329**
Pleutz, Paul F.
The Metric System: A Programmed Approach.
Pub Date 72
Note—122p.
Available from—Charles E. Merrill Pub. Co., 1300 Alum Creek Dr., Columbus, OH 43216 (no price quoted)
Document Not Available from EDRS.
Descriptors—Concept Teaching, Laboratory Manuals, Mathematics, Measurement, *Metric System, *Programed Materials, *Programed Texts, Relevance (Education), *Science Materials, *Study Guides

This 8-unit programed manual was developed to assist Americans in becoming more proficient in the use of the metric system. Containing most of the basic essentials of metric measurement required for mathematics and science programs, the text includes practically oriented practice problems and activities. In addition, an appendix contains: (1) A metric laboratory practice section, (2) A section on exponents as simplified numerals, (3) A proficiency text, (4) Question and answer sheets, (5) Metric conversion tables, (6) A series of line drawings of the necessary laboratory equipment for students, and (7) A section on safety practices to be followed in the laboratory. (SN)

ED 078 196 **VT 020 392**
Information on the Metric System and Related Fields.
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
Pub Date 1 Nov 72
Note—34p.; Fourth Edition
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Audiovisual Aids, Books, Information Dissemination, *Information Sources, *Instructional Aids, *Metric System, Military Organizations, *Resource Guides, Resources
Identifiers—Marshall Space Flight Center

Contained in this guide are announcements of references and audio-visual courses on the metric system and related fields available at the Marshall Space Flight Center. Included by sectional entries are listings of: (1) books, (2) reports, papers and articles, (3) periodicals, (4) film strips, (5) posters, (6) education and training courses, (7) materials produced by the International Organization for Standardization, (8) materials produced by the International Electrotechnical Commission, (9) conversion tools, (10) addresses of sources from which other information can be obtained, and (11) sources from which metric tools, instruments and components can be obtained. (SN)

ED 085 204 **SE 015 731**
Eaum, Kenith Gene
Evaluation of a Metric Booklet as a Supplement to Teaching the Metric System to Undergraduate Non-Science Majors.
Pub Date 72
Note—117p.; Ed.D. Dissertation, University of Southern Mississippi
Available from—University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106 (Order No. 72-26,540 Microfilm-$4.00, Xerography-$10.00)
Document Not Available from EDRS.
Descriptors—Doctoral Theses, Educational Research, *Instructional Materials, *Metric System, Physical Sciences, *Science Instruction, Supplementary Textbooks
Identifiers—*Research Reports

Examined is the effectiveness of a method of teaching the metric system using the booklet, Metric Supplement to Mathematics, in combination with a physical science textbook. The participants in the study were randomly selected undergraduates in a non-science oriented program of study. Instruments used included the Metric Supplement to Mathematics and McFee's Metric Test. Three one-way analysis of variance tests were used to determine significant differences between groups on the proficiency section, intuitive section, and the overall test results. The ability of the students to think in metric measures was significantly improved by using the booklet. Students learned metric units within a short period of time. (Author/EB)

ED 085 251 **SE 017 072**
Metric Exercises. Lively Activities on Length, Weight, Volume, and Temperature.
National Science Teachers Association, Washington, D.C.
Pub Date 73
Note—35p.; Metric ruler, thermometer, and centimeter cube not available from EDRS
Available from—National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036 (Stock No. 471-14664, $6.00)
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Activity Units, Elementary School Mathematics, *Instructional Materials, Manipulative Materials, *Mathematics Education, Measurement, *Metric System, *Science Education, Secondary School Mathematics, Worksheets

This booklet of exercises and activities to help students learn the fundamentals of the metric system is designed for elementary, junior high school and senior high school students. It is organized under four topics (Length, Weight, Volume, and Putting it All Together Activities) and comes packaged with an ungraded thermometer, metric rulers, and a 1-gram centimeter cube. The activities and exercises can be simplified or extended to meet the needs of the class or individual students. An answer key is included as the final section. (JP)

ED 086 551 **SE 017 223**
Negus, LeRoy
Let's Use the Metric System: A Supplement to Mathematics K-6.
New York State Education Dept., Albany. Bureau of Elementary Curriculum Development.
Pub Date 73
Note—15p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Curriculum, *Elementary School Mathematics, Guides, Instruction, Instructional Materials, Learning Activities, *Measurement, *Metric System, Objectives, *Teaching Techniques

This bulletin provides elementary school teachers with some information about the metric system and some suggestions for teaching it. A history of the development of the system is given followed by a grade by grade guide to objectives and activities to be used with lessons on measurement with the metric system. The activities stress the decimal character of the metric system and provide opportunities for the students to gain an intuitive feeling for the comparative size of the various units of measure. (JP)

ED 087 630 **SE 017 264**
Bargmann, Theodore John
An Investigation of Elementary School Grade Levels Appropriate for Teaching the Metric System.
Pub Date 73
Note—205p.; Ph.D. Dissertation, Northwestern University
Available from—University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan 48106 (Order No. 73-30,527 Microfilm-$4.00, Xerography-$10.00)
Document Not Available from EDRS.
Descriptors—Achievement, *Curriculum, Decimal Fractions, Doctoral Theses, *Elementary School Mathematics, Instruction, *Learning, Learning Readiness, Measurement, *Metric System, *Research
Identifiers—Research Reports

This study was concerned with identification of elementary school grade levels appropriate for teaching various phases of the metric system. The same unit was taught to 201 elementary school children in grades three through six. Pretests and posttests were used to assess progress made by students in developing skills and understandings related to the metric system. Comparison of grade levels was accomplished by analysis of covariance with 0.01 chosen as the significance level. Differences in grade level had no significant effect in achievement for children's learning the metric system concerning understanding the meaning and approximate sizes of metric units, understanding use of measurement equipment, understanding the organization of the metric system, and the ability to measure length in the metric system using whole numbers. Achievement of grade three was significantly lower than other grades on the ability to measure liquid volume and weight using whole numbers. Grades five and six achieved significantly higher on conversion between metric units, on determination of area and cubic volume, on measurement of length, liquid volume and weight using decimals and on conversion between metric units using decimals. Highest overall achievement in learning the metric system was attained by pupils in grade five. (Author/JP)

ED 087 635 **SE 017 362**
Glaser, Anton
Neater by the Meter: An American Guide to the Metric System.
Pub Date 74
Note—112p.
Available from—Anton Glaser, 1237 Whitney Road, Southampton, Pennsylvania 18966 (Paperbound $3.50, Hardbound $6.50)
Document Not Available from EDRS.
Descriptors—*Instruction, Instructional Materials, *Mathematics Education, *Measurement, *Metric System, *Standards, , Teaching Techniques

This booklet is written for the non-technical person and is oriented around the needs of everyday life. The relative size of metric units of measure is illustrated through common and familiar objects. This informal approach provides an introduction to units of distance measure, volume, weight, and temperature in the metric system. Part II of this booklet relates some of the historical background of the metric system and presents the latest international recommendations that are not yet in use in many metric countries. Advantages and claimed disadvantages for or against the adoption of the metric system are reviewed and suggested teaching practices for those who want to help others learn the system are presented. (JP)

ED 070 833 VT 018 028
Gordon, Gerald F.
International Trade. U.S. Metric Study Interim Report.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-8
Pub Date Jul 71
Note—182p.
Available from—Superintendent of Documents, [illegible]S. Government Printing Office, Washington, [illegible].C. 20402 (Catalog No. C13.10:345-8, $1.50)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Economics, *Foreign Relations, *Government Publications, Government Role, *Industrial Relations, Industrial Technology, *Metric System, *National Surveys, Social Change, Tables (Data), Technological Advancement
Identifiers—*International Trade

In order to evaluate the potential effects of U.S. conversion to SI (Systems International) units on U.S. foreign trade, 188 export product classes and 155 import product classes were selected from 1,166 Standard Industrial Classification (SIC) product classes and questionnaires were mailed to a total of 510 firms, utilizing separate forms for exporters and importers. Drawn from a computerized national index of industries, the number of forms selected for each product class was based on the total trade volume of the product class, which generally fell within one of these four groupings: (1) nonelectrical machinery, (2) electrical equipment and supplies, (3) transportation equipment, and (4) instruments and related products. American technological superiority appeared to be our chief advantage in international trade. Conversion to SI units would favorably influence U.S. exports rather than imports into the United States. A detailed summary of findings precedes extensive descriptions of the possible effects of metrication on U.S. international trade, specifically focusing upon seven selected American industries. Numerous tables present the data. Related documents are available as VT 018 023-018 028 and VT 018 036-018 037 in this issue, and VT 017 558 and VT 017 564 in March 1973 RIE. (AG)

[illegible] 070 841 VT 018 036
[illegible]og, June R. Bunten, Elaine D.
Nonmanufacturing Businesses. U.S. Metric Study Interim Report.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-5
Pub Date Jul 71
Note—193p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Catalog No. C13.10:345-5, $1.50)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Business, *Government Publications, Government Role, Industrial Relations, Industrial Technology, *Metric System, *National Surveys, Retraining, Social Change, Tables (Data), Technological Advancement
Identifiers—*Nonmanufacturing Businesses

In this fifth interim report on the feasibility of a United States changeover to a metric system stems from the U.S. Metric Study, a primary stratified sample of 2,828 nonmanufacturing firms was randomly selected from 28,184 businesses taken from Social Security files, a secondary sample of 2,258 firms was randomly selected for replacement purposes, and 40 railroads were also sampled by means of interviews. Of the 2,563 useable interviews, equal numbers of firms were chosen according to these factors: (1) small, medium, or large size, and (2) industrial classifications for nonmanufacturing businesses, including agribusiness, mining, human services, construction, human and producer services, finance, transportation, communication, and related areas. A national program for metrication was seen as the only major impetus for conversion of individual businesses to SI (Systems International) units. The retraining of labor was seen as the chief obstacle to conversion. Background infor[illegible] for the study, a general discussion of sur[illegible]dings, and a summary of conclusions from the study are included. Numerous tables present the data. Related documents are available as VT 018 023-018 028, and VT 018 036-018 037 in this issue, and VT 017 558 and VT 017 564 in March 1973 RIE. (AG)

ED 070 842 VT 018 037
The Consumer. U.S. Metric Study Interim Report.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-7
Pub Date Jul 71
Note—147p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Catalog No. C13.10:345-7, $1.25)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Consumer Economics, Consumer Science, Glossaries, *Government Publications, Government Role, *Majority Attitudes, *Metric System, *National Surveys, Social Change, Social Problems, Tables (Data)

This interim report, as the seventh in a series was prepared by the National Bureau of Standards to provide a better basis for Congressional evaluation of the feasibility of a United States changeover to a metric system. Information is presented on American consumers' knowledge of the metric system and on their attitudes and opinions regarding metrication in the United States. The effects of increasing worldwide metric usage on selected areas of consumer concern are discussed. This study is based on: (1) an extensive survey conducted by the Survey Research Center for the University of Michigan, and (2) papers on specific areas of consumer interest. The survey data permitted an analysis of the receptivity of consumers to metrication, and of the need and possible effectiveness of a program to educate citizens should planned metrication be undertaken. Various tables present the data. Related documents are available as VT 018 023-018 028, and VT 018 036-018 037 in this issue, and VT 017 558 and VT 017 564 in March 1973 RIE. (Editor/AG)

ED 072 218 VT 018 577
Education: U.S. Metric Study Interim Report.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-6
Pub Date Jul 71
Note—208p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (S/N 0303-0858, $1.75)
EDRS Price MF-$0.65 HC-$9.87
Descriptors—*Educational Change, *Educational Needs, Educational Planning, *Educational Responsibility, *Feasibility Studies, Government Publications, *Metric System, National Surveys, Resource Materials
Identifiers—National Metric Study Conference on Education

This interim report, as the sixth in a series was prepared to provide a better basis for Congressional evaluation of the feasibility of a United States changeover to a metric system. This study concerning the effects of increasing worldwide use of the metric system on education in the United States was carried out by the Education Development Center in Newton, Massachusetts. The aims of the study were to: (1) assess the educational advantages and disadvantages of both the metric and the customary systems of units, (2) determine the current usage of metric measures in U.S. schools and trends in that usage, (3) find the ways in which education would have to change as the U.S. accommodates to increased worldwide use of the metric system, under either a laissez-faire or a planned approach, and estimate the costs of the changes, and (4) make recommendations of ways in which to take best advantage of these changes. Methods of achieving curriculum changes needed in view of increasing metric usage are discussed. An appendix contains the program of the Education Conference held in October 1970 as one of a series of National Metric Study Conferences. The texts of the key papers presented at that conference by the National Education Association and the National Science Teachers Association are also appended. (Editor/AG)

ED 073 230 VT 018 433
Going Metric: Looking Ahead. Report of the Metrication Board for 1971.
Metrication Board, London (England).
Pub Date 72
Note—94p.
Available from—Pendragon House, Inc., 899 Boardway Avenue, Redwood City, CA 94063
Document Not Available from EDRS.
Descriptors—*Adjustment Problems, Economic Progress, *Educational Needs, Government Role, *Industrial Technology, *Metric System, *National Programs, Program Descriptions, Program Development, Social Change, Standards, Technological Advancement
Identifiers—*Great Britain, Metrication Board

Great Britain began changing to the metric system in 1965, in order to improve industrial efficiency and to increase its competitive strength in international trade. Despite internal and external pressures calling for acceleration of the rate of change, a loss of momentum in expanding use of metric standards was noted in 1971. In order to accomplish a complete changeover by 1975, the transitional period should be as short as possible and the change should not be confined to manufacturing industries. The government should provide positive support for metrication, including necessary legislation and publicity. This report on the Board's work in 1971 discusses the progress of metrication in the following areas: (1) education and industrial training, (2) transportation and communications, (3) fuel and power, (4) agriculture, horticulture, forestry, fisheries, and land, (5) industrial materials, (6) construction industry, (7) engineering industries, (8) weighing machines, (9) metrication and the consumer, (10) public relations, and (13) metrication progress overseas. (AG)

ED 075 227 SE 015 922
Page, Chester H., Ed. Vigoureux, Paul, Ed.
The International System of Units (SI).
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-330
Pub Date Apr 72
Note—51p.; Supersedes NBS-SP-330, 1971 Edition
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (Order No. C 13.10:330/2, $0.30)
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Geometric Concepts, Mathematical Applications, *Mathematics, *Measurement, *Metric System

This document gives definitions and symbols for the basic units of measure, for derived units, and for supplementary units. Decimal multiples and sub-multiples of units and units outside the International System also are discussed. Appendix I reproduces the decisions made on units and on the International System by two committees (the General Conference of Weights and Measures and the International Committee of Weights and Measures) since 1889; Appendix II outlines methods which metrological laboratories can use to derive the units and to calibrate standards. (DT)

ED 075 683 VT 020 103
Metrication: A Guide for Consumers.
Consumer and Corporate Affairs Dept., Ottawa (Ontario).
Report No—Consum-RR-2
Pub Date 72
Note—25p.
Available from—Information Canada, Ottawa, Canada (Cat. No.: RG 31-2/1972)
Document Not Available from EDRS.
Descriptors—*Consumer Economics, Economic Research, Foreign Countries, *Guides, *Merchandise Information, *Metric System
Identifiers—*Canada

The widespread use of the metric system by most of the major industrial powers of the world has prompted the Canadian government to investigate and consider use of the system. This booklet was developed to aid the consuming public in Canada in gaining some knowledge of metrication and how its application would affect their present economy. Included are: (1) an operational definition of metrication, (2) an explanation of the planned conversion process and what it would mean in terms of automobiles, food, clothing, furnishings, hardware and lumber, household equipment, paper, maps, weather, drugs, postage rates, and photographic materials, and (3) anticipated problems with the system resulting from conversion. (SN)

ED 068 326 SE 014 830
U.S. Metric Study Interim Report: A History of the Metric System Controversy in the United States.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-10
Pub Date Aug 71
No[illegible]308p.; Tenth in a series of interim reports [illegible]red for the Congress of the United States
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (Catalog No. C 13.10:345-10 $2.25)
EDRS Price MF-$0.65 HC-$13.16
Descriptors—*Historical Reviews, History, *Mathematics, Mathematics Education, *Measurement, *Metric System, *Science History
Identifiers—United States Metric Study

This document reviews the debate between 1790 and 1968 on the question of the adoption of the metric system of weights and measures by the United States. Legislative activities involving the metric system and campaigns for and against adoption of the metric system are reviewed. Significant investigations of the question by both public and private groups are highlighted. An extensive bibliography is included. For related documents, see ED 055 590, ED 065 340, ED 065 341, ED 065 342, and ED 065 343. (DT)

ED 068 330 SE 014 844
Odom, Jeffrey V.
A History and Overview of Metrication and Its Impact on Education.
Pub Date [72]
Note—19p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Curriculum, Historical Reviews, Instruction, Mathematics, *Mathematics Education, *Measurement, *Metric System

This paper gives a brief history of measurement systems and of the controversy surrounding the adoption of the metric system as the standard system in the United States. The metric study called for by legislation in 1968 is described, and recommendations for a coordinated national program [illegible]change to the metric system are outlined. Som[illegible]plications for education are discussed, with [illegible] comments on curriculum, textbooks, teacher training, educational materials, and three general teaching suggestions. (DT)

ED 068 650 VT 016 947
Metrication at Work. Training Manual.
Local Government Training Board, London (England).
Pub Date 71
Note—42p.
Available from—Local Government Training Board, Alembic House, 93 Albert Embankment, London SE1 7UB, England
Document Not Available from EDRS.
Descriptors—*Manuals, Measurement, *Metric System, On the Job Training, Staff Orientation, *Training Techniques
Identifiers—*England

England is in the process of changing to the metric system of measurement. This manual was prepared to help in the metrication training of persons who are directly involved in manipulations of metric units in their jobs or who are required to work with them. A method of organizing and controlling the training is outlined which provides for training new employees as well as existing staff. Much of the training should be planned around procedures and materials used in specific jobs, and job-oriented training techniques may be devised as needed for different categories of staff. Examples of typical job exercises are included in the manual, along with control forms and a criterion test to assess the learner's knowledge. (MF)

ED 070 636 SE 015 200
Metric Conversion. Hearing Before the Committee on Commerce, United States Senate, 92 Congress, Second Session on S.2483 and S.J.Res. 219.
Congress of the U.S., Washington, D.C. Senate Committee on Commerce.
Pub Date 72
Note—330p.
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 ($1.25)
EDRS Price MF-$0.65 HC-$13.16
Descriptors—Administrative Policy, Committees, Development, *Federal Legislation, *Mathematics, *Mathematics Education, *Metric System, *National Programs

Presented in this bulletin is the text of the hearing before the Committee on Commerce, United States Senate, ninety-second Congress, concerning coversion of the Nation to a metric system of weights and measures. Bill S. 2483 calls for providing a national program in order to make the international metric system the official and standard system of measurement in the United States and to provide for converting to general use of such a system within ten years after the date of enactment of the Act. Accompanying this is joint resolution, S.J. Res. 219, to establish a national policy relating to conversion to the metric system in the United States. The texts of the bill and resolution are given as well as prepared comments from several government agencies. Statements from individual witnesses follow and additional articles, letters, and statements submitted for the record are also recorded. Willian G. Magnuson, Washington, chaired the committee hearings held February 29, and March 1, 1972. (BL)

ED 070 819 VT 017 913
Metrication in the States.
Council of State Governments, Lexington, Ky.
Pub Date 15 Dec 70
Note—15p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Feasibility Studies, Investigations, Measurement, *Measurement Instruments, Measurement Techniques, *Metric System, *State Surveys
Identifiers—*Metrication

Prompted by the widespread use of the metric system by most major industrial countries of the world, the United States Congress in 1969 initiated the passage of a bill authorizing the research and investigation of metrication to determine the worldwide impact of its use on this country so as to decide which route it should take. Data were obtained from personal interviews with public officials in Kentucky and California, chosen for their representativeness of location, size, and council staff proximity. An analysis of the findings revealed that: (1) the pressure within States to change due to worldwide metrication is limited; (2) there exists no extensive use of the system at present except in laboratories, pharmaceuticals, testing, and some journal reports; (3) contact with foreign countries and their metrically engineered products is small; and (4) more study and planning of the system is needed. States generally do not favor conversion; therefore, any initiation of change to the system will probably come only from pressure exerted from the Federal level. Highway, transportation, and other similar agencies who perform engineering functions will perhaps have the hardest adjustments to make. (SN)

ED 070 829 VT 018 024
Huntoon, Robert D. And Others
International Standards. U.S. Metric Study Report.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-1
Pub Date Dec 70
Note—146p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Catalog No. C13 10:345-1, $1.25)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Evaluation Needs, Foreign Relations, *Government Publications, *Government Role, Industrial Relations, International Law, International Programs, *Metric System, *National Surveys, Resource Materials, *Standards

In this first interim report on the feasibility of a United States changeover to a metric system stems from the U.S. Metric Study, a series of conclusions and recommendations, based upon a national survey of the role of SI (System's International) units in international trade and other areas of foreign relations, includes the following suggestions: (1) The extent to which the United States should participate in international standardization of measurement units must soon be decided, (2) Other important factors must be considered in addition to the international standards issue before judging the advantages of metrication, (3) Product certification standards for exports will probably be necessary, (4) The import-export pattern of measurement-sensitive goods should be studied, and (5) The Department of Commerce should initiate economic policy changes in accordance with the development of plans for metrication. A wide range of resource materials is appended, including a list of selected questionnaires being utilized in the U.S. Metric Study. Related documents are available as VT 018 023-018 028, and VT 018 036-018 037 in this issue, and VT 017 558 and VT 017 564 in March 1973 RIE. (AG)

ED 070 832 VT 018 027
Hatos, Stephen L.
Commercial Weights and Measures. U.S. Metric Study Interim Report.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345-3
Pub Date Jul 71
Note—108p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Catalog No. C13.10:345-3, $1.00)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Business, *Government Publications, Government Role, *Measurement, *Metric System, *National Surveys, Resource Materials, Social Change
Identifiers—*Commercial Weights and Measures

This interim report is the third in a series prepared pursuant to the U.S. Metric Study Act. The effects metrication would have on commercial weights and measures activities, are explored. Specifically, the report deals with: (1) the cost of adapting or changing commercial weighing and measuring devices to record or indicate in metric units, and (2) the effects of metrication on state and local weights and measures jurisdictions. Various resource materials are appended. Related documents are available as VT 018 023-018 028 and VT 018 036-018 037 in this issue, and VT 017 558 and VT 017 564 in March 1973 RIE. (Editor/AG)

ED 052 992 **SE 012 138**

Lighthill, M. J. And Others
Metric Units in Primary Schools.
Royal Society, London (England).
Pub Date Apr 70
Note—30p.
Available from—Royal Society, Executive Secretary, 6 Carlton House Terrace, London, S.W.1, England
Document Not Available from EDRS.
Descriptors—*Elementary School Mathematics, *Elementary School Science, *Instruction, *Metric System, *Teaching Guides
Identifiers—United Kingdom

Although this pamphlet is intended as background material for teachers in English primary schools changing to the System International d'Unites (SI units), the form of the metric system being adopted by the United Kingdom, the educational implications of the change and the lists of apparatus suitable for use with children up to 14 years of age are sufficiently general for use in other countries introducing the metric system of weights and measures. Some of the teaching ideas are applicable to introducing metric units for science instruction. (AL)

ED 054 951 **SE 012 387**

Measure for Measure: A Guide to Metrication for Workshop Crafts and Technical Studies.
Schools Council, London (England).
Pub Date 70
Note—62p.
Available from—Evans Brothers Limited, Montague House, Russell Square, London WC1, England
Document Not Available from EDRS.
Descriptors—Equipment, *Industrial Arts, *Mathematical Applications, *Measurement, *Metric System, Resource Guides, *Secondary School Mathematics, Technical Mathematics
Identifiers—International System of Units

This booklet is designed to help teachers of the industrial arts in Great Britain during the changeover to metric units which is due to be substantially completed during the period 1970-1975. General suggestions are given for adapting equipment in metalwork and engineering and woodwork and technical drawing by adding some metric equipment immediately and then replacing present stock with metric equipment as it wears out. Details of how one secondary school has tackled this conversion are described, and the problem of "keeping in step" during the changeover is also discussed. Appendices describe the International System of Units (SI); metric machine speeds; the use of existing drills to form an approximate metric series; re-calibration of machine dials for metric measurement; metric sizes for woodworking tools, supplies and drawing paper; and suggestions for educational projects during the changeover period. (MM)

ED 054 955 **SE 012 400**

The Use of SI Units.
British Standards Institution, London (England).
Report No—PD-5686
Pub Date Jan 69
Note—28p.
Available from—British Standards Institution, 101-113 Pentonville Road, London, N.1, England
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Mathematical Applications, *Mathematics, *Measurement, *Metric System, Physics, Resource Guides, Technical Mathematics
Identifiers—*International System of Units

This booklet (referred to as PD 5686:1969) replaces the 1967 edition by including subsequent recommendations of the International Organization for Standardization (ISO) and the General Conference on Weights and Measures (CGPM). The International System of Units (SI) is described and rules are given for the formation of derived units and decimal multiples and submultiples. The major part of this booklet is a list of the SI units for various physical quantities, the recommended multiples and submultiples of these units, and the non-SI units which may also be used. Further tables give definitions of derived SI units with special names, the value of some imperial units in terms of SI units, and related British Standards publications. (MM)

ED 055 884 **SE 012 570**

De Simone, Daniel V.
A Metric America: A Decision Whose Time Has Come.
National Bureau of Standards (DOC), Washington, D.C.
Report No—NBS-SP-345
Pub Date Jul 71
Note—192p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Catalog No. C 13.10/345 $2.25)
EDRS Price MF-$0.55 HC-$6.58
Descriptors—Business, *Economics, Industry, *International Trade Vocabulary, Measurement, *Metric System, Standards, *Technology
Identifiers—International System of Units, *United States Metric Study

This report evaluates and distills the findings of the United States Metric Study in which thousands of individuals, firms and organized groups, representative of our society, participated. On the basis of all the evidence marshalled in the Study, the report concludes that the United States should change to the metric system through a coordinated national program. The chapter headings are: I. Perspective, II. Two Centuries of Debate, III. Measurement Systems, IV. Arguments That Have Been Made for Metric and for Customary, V. Going Metric: What Would It Really Mean?, VI. The Metric Question in the Context of the Future World, VII. Going Metric: The Broad Consensus, VIII. Recommendation and Problems Needing Early Attention, IX. Benefits and Costs, and X. Two Paths to Metric: Britain and Japan. The report includes a bibliography of 12 supplemental reports authored by members of the United States Metric Study Group. (Author/MM)

ED 118 425 **SE 020 271**

Mowry, Catherine M.

An Effort to Produce a Recommended List of Elementary Metric Materials.

Pub Date 1 Sep 75

Note—131p.; Maxi II Practicum Report submitted in partial fulfillment of the requirement for the cegree of Doctor of Education, Nova University; Occasional marginal legibility

EDRS Price MF-$0.83 HC-$7.35 Plus Postage

Descriptors—Audiovisual Aids, Cost Effectiveness, Elementary Education, *Elementary School Mathematics, Evaluation, *Instructional Materials, Mathematics Education, Mathematics Materials, Measurement, *Metric System, Program Descriptions, Research, *Resource Materials, *Textbook Evaluation

The purpose of this study was to produce a list of materials for metric instruction in the elementary school. The Charles H. Taylor School in Boston was used as a laboratory for the collection, study, and evaluation of published metric materials. Problems inherent in the introduction of the metric system in four dissimilar elementary schools were studied. The main concerns focused on staff training and conversions, pupil incentives, and community/parental support and involvement. A primary administrative concern is that of finding money to purchase texts and materials for metrication. This paper describes the preliminary steps involving suppliers, staff, community, and school personnel, as well as procedures involving faculty and students for evaluating materials and programs. The paper includes a recommended list of the metric materials and aids judged to be most worthwhile for use in the elementary school. It was also recommended that a faculty review and use the materials before ordering them; that materials be learner-tested; that resource rooms to established and materials be shared to reduce costs; and that descriptive cost-analysis lists be distributed to assist in the purchase of cost-effective metric materials. (JBW)

ED 118 431 **SE 020 280**

Metric Education, Interpretive Report No. 1.

George Washington Univ., Washington, D.C. Inst. for Educational Leadership.

Spons Agency—National Inst. of Education (DHEW), Washington, D.C.

Pub Date Dec 75

Contract—NIE-C-400-75-0027

Note—15p.

EDRS Price MF-$0.83 HC-$1.67 Plus Postage

Descriptors—Curriculum, Elementary School Mathematics, *Elementary Secondary Education, Guidelines, *Mathematics Education, Measurement, *Metric System, *Planning, Post Secondary Education, *Research Reviews (Publications), Secondary School Mathematics

Identifiers—AIR, American Institutes for Research, *National Institute of Education, NIE

This report reviews the findings of two projects funded by the National Institute of Education (NIE) and conducted by the American Institutes for Research (AIR). The project reports, "Going Metric" and "Metric Inservice Teacher Training," document the impact of metric conversion on the educational systems of Great Britain, New Zeland, Australia, South Africa, and Canada in order to provide educators and other planners with guides for preparing a national conversion program. Three vital needs were identified for a successful conversion policy in the U.S.: (1) a broad-scale involvement of all major elements in early planning, (2) a committed government policy and firm schedules, and (3) continued communication and coordination as conversion progresses. Recommendations include: (1) the creation of a national evaluative body that would establish clear uniform standards for metric educational materials; and (2) a coordinated teacher training strategy, with direct communication links with teachers and provisions for feedback on metric curriculum materials. (JW)

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EDUCATION

B.A. - Bucknell University, Lewisburg, PA - 1955
M.Ed. - Georga Washington University, Washington, DC - 1976

Graduate Studies
Columbia University, New York City
Western Maryland University, Westminister, MD
University of Maine, Augusta, ME

JOB ASSIGNMENTS

Time, Inc. - Trainee in all phases of the publishing compound (Time, Life, Life International, Architectural Forum, Fortune, Sports Illustrated, and Time-Life books) - 1956

Medical Economics - Art production for all publications (RN Magazine, Medical Economics, RISS, Physician's Desk Reference) - 1957-60

National Science Teachers Association - Associate Editor, The Science Teacher - 1961-63; Production Manager, Elementary School Science Bulletin - 1961-63; Associate Editor, Science and Children - 1963-65; Editor, Science and Children - 1965 - ; Director, Division of Elementary Education

MAJOR ARTICLES, BOOKS, AND OTHER PUBLICATIONS

Illustrator for Selected Readings for Students of English as a Second Language, Educational Services, Washington, DC - 1966

Compiler, Opportunities for Summer Studies in Elementary Science, NSTA - 1967, 1968

Author, photographer, and illustrator of numerous articles in Science and Children as well as various publications and materials

Consultant on filmstrip series, National Geographic Society

Investigations in Ecology (with Beth Schultz), Charles E. Merrill Publishing Company, Columbus, OH - 1972

HONORS AND PROFESSIONAL ACTIVITIES

Good Citizen Award from the Daughters of the American Revolution

National Honor Society; Dean's List

Gold Medalist for Photo Essay from the Greater Washington Council of Camera Clubs

Numerous photo awards

Theta Alpha Phi Honorary

Phi Delta Gamma Honorary

CESI Awards for Outstanding Contributions of Science Education - 1971, 1972

Educational Press Association of America - National Regional Director - 1969-71; Treasurer, Washington, DC Chapter - 1966; Steering Committee - 1974-75; President - 1975-76; Distinguished Achievement Awards from the Association for Science and Children (for typography, series, feature articles, theme issue) - 1969, 1971, 1972, 1973, 1974

Honorary Life Membership Award by the Ohio Council for Elementary School Science - 1973

Who's Who in America

Who's Who of American Women

VITA

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EDUCATION

B.A. - Douglass College, New Brunswick, NJ - 1965
Teacher Certification - Newark State College, Union, NJ - 1969

JOB ASSIGNMENTS

Caseworker - NJ Bureau of Children's Services, Elizabeth, NJ - 1965-67

Teacher (grade 5) - Clark Board of Education, Clark, NJ - 1967-74
- Science Specialist for fifth grades at Karl Kumpf School
- Individualization of Instruction Committee (2 years)
- Science Committee (2 years)
- Editor of Science Newsletter (2 years)
- Piloted SCIS science program and "On My Own" science kit
- Reorganized fifth grade studies program to include individualized instruction
- Prepared individualized science contracts and language kits
- Author of Health Curriculum Guide (grades 4-6) for system-wide use

Editorial Aide - NSTA - 1975 -
- Author of metric lesson plan for Measurement and the Metric System II Science Packet
- Articles which have appeared in Science and Children: "The Liberty Bell" and "Bicentennial Bonsai"

Additional activities
- Reviewed book manuscript on metric education for Acropolis Books, Washington, DC

VITA

Marily DeWall
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Editor, Packet Teachers' Guides
National Science Teachers Association
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EDUCATION

B.A. - George Washington University, Washington, DC - 1964 (International Affairs)

JOB ASSIGNMENTS

Researcher - U.S. News and World Report (1964-66)

Editorial Assistant and Associate Editor - Science and Children - 1966-70

Director - NSTA/CESI Elementary Science Packet Service - (1972-)
Editor of packet Teachers' Guide
Compiled two packets of metric teaching aids which are commercially available
Editor of series of manuscripts which resulted in NSF-funded publication, "Innovative Project Activities in Science"
Staff liaison on the NSTA Committee of Middle/Junior High School Science Teaching

PERSONAL DATA

Marily is married to a marine geologist, has two children, and spends some of her time camping, traveling by motorcycle, and sailing